HORTICULTURAL ABSTRACTS

Vol. XXXI December 1961 No. 4

Initialled reviews not by Bureau staff are by D. Akenhead and G. St. C. Feilden. In addition, many of the abstracts of Australian papers have been prepared by members of the C.S.I.R.O. staff in Melbourne.

INDEX OF CONTENTS.

Nos.

MISCELLANEOUS
Abstr. 132. Noted 52 5596-5779
- General 5596-5601
- Climate and air pollution 5602-5613
- Seeds 5614-5623
- Propagation and nursery methods 5624-5628
- Soil composts and soil amendments 5629-5635
- Water and irrigation 5636-5643
- Nutrition 5644-5659
- Radioactive contamination 5660-5661
- Soilless culture 5662-5664
- Tissue culture 5665-5666
- Physiology and metabolism 5667-5688
- Growth substances 5689-5704
- Pollen 5705
- Storage and marketing 5706-5709
- Herbicides and weed control 5710-5722
- Plant protection 5723-5749
- Chemical residues and their analysis 5750-5753
- Experimental techniques 5754-5760
- Practical and research equipment 5761-5770
- Greenhouses 5771-5779

TEMPERATE TREE FRUITS
Abstr. 134. Noted 36 5780-5949
- General 5780-5795
- Breeding and varieties 5796-5807
- Propagation and rootstocks 5808-5824
- Climatic factors 5825-5840
- Soil management and irrigation 5841-5853
- Nutrition and tree composition 5854-5866
- Growth and physiology 5867-5882
- Planting and spacing 5883-5886
- Pruning and training 5887-5896
- Pollination and fruit set 5897-5901
- Flower and fruit thinning 5902-5909
- Fruit development, composition and quality 5910-5921
- Harvesting, packing and marketing 5922-5928
- Storage 5929-5946
- Processing and by-products 5947-5949

SMALL FRUITS, VINES AND NUTS
Abstr. 116. Noted 25 5950-6090
- Strawberries 5950-5971
- Other small fruits 5972-5994
- Vines—general 5995-6004
- Vines—breeding and varieties 6005-6009
- Vines—propagation and rootstocks 6010-6016
- Vines—climatic factors 6017-6023
- Vines—growth, physiology and reproduction 6024-6035
- Vines—training and pruning 6036-6041
- Vines—soil management, irrigation and nutrition 6042-6058
- Vines—defoliation 6059
- Vines—fruit quality 6060-6061
- Temperate nuts 6062-6090

PLANT PROTECTION OF TEMPERATE FRUITS
Abstr. 117. Noted 26 6091-6233
- General 6091-6095
- Disorders of uncertain or complex origin 6096-6103
- Viruses 6104-6131
- Bacteria 6132-6138
- Fungi 6139-6171
- Nematodes 6172-6174
- Mites 6175-6183
- Insect pests 6184-6213
- Other pests 6214
- Chemicals and their application 6215-6233

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE
Abstr. 209. Noted 54 6234-6496
- General 6234-6258
- Artichokes 6259-6261
- Asparagus 6262-6268
- Brassicas 6269-6285
- Celery 6286-6293
- Cucurbits 6294-6319
- Legumes—beans 6320-6348
- Legumes—peas 6349-6361
- Lettuce and other salad crops 6362-6374
- Mushrooms 6375-6380
- Okra 6381-6382
- Onions and related crops 6383-6405
- Rhubarb 6406-6407
- Root crops 6408-6418
- Spinach 6419-6420

Nos.
Sweet and red peppers and eggplants 6421-6432
Tomatoes—general 6433-6434
Tomatoes—breeding and varieties 6435-6444
Tomatoes—seedling production and planting 6445-6447
Tomatoes—irrigation and nutrition 6448-6452
Tomatoes—environment, growth and physiology 6453-6469
Tomatoes—disorders and diseases 6470-6480
Tomatoes—pests 6481-6488
Tomatoes—fruit harvesting, quality, composition and storage 6489-6496

TOBACCO

Abstr. 55. Noted 12 6497-6563

General 6497-6503
Breeding and varieties 6504-6509
Seeds and seed-beds 6510-6514
Planting, cultivation and de-suckering 6515-6519
Drought resistance and irrigation 6520-6521
Nutrition and mineral composition 6522-6531
Physiology and biochemistry 6532-6538
Disorders, diseases and pests 6539-6555
Processing and by-products 6556-6563

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS

Abstr. 70. Noted 27 6564-6660

Condiment and spice plants 6564-6570
Drug plants 6571-6599
Essential oils 6600-6619
Fibres 6620-6625
Gums and resins 6626-6627
Hops 6628-6635
Insecticidal plants 6636
Rubber plants 6637-6638
Seed oils 6639-6651
Sugar maples 6652-6654
Tannin plants 6655
Sundry plants 6656-6660

FLORICULTURE

Abstr. 130. Noted 56 6661-6846

General 6661-6676
Carnations 6677-6689
Chrysanthemums 6690-6706
Other annual and herbaceous plants 6707-6722
Bulbs, tubers, etc. 6723-6762
Lawns and sports turf 6763-6773
Foliage and succulent plants 6774-6778
Orchids 6779-6787
Roses 6788-6799
Other trees and shrubs 6800-6846

SUB-TROPICAL FRUIT AND PLANTATION CROPS

Nos.
Abstr. 84. Noted 27 6847-6957

Avocadoes 6847-6850
Citrus—general 6851-6854
Citrus—breeding, varieties and rootstocks 6855-6863
Citrus—soil management and nutrition 6864-6875
Citrus—growth and reproduction 6876-6881
Citrus—physiology and fluorine responses 6882-6885
Citrus—diseases 6886-6898
Citrus—pests 6899-6916
Citrus—fruit quality and composition 6917-6923
Citrus—fruit harvesting and handling 6924-6937
Dates 6938-6940
Feijoas 6941-6942
Loquats 6943
Macadamias 6944
Olives 6945-6950
Passion fruit 6951-6952
Tung 6953-6957

TROPICAL FRUIT AND PLANTATION CROPS

Abstr. 227. Noted 55 6958-7239

General 6958-6965
Areca palms 6966-6968
Bananas 6969-6987
Cacao—general 6988-6991
Cacao—selection, propagation and planting 6992-7004
Cacao—soil management and nutrition 7005-7012
Cacao—environment, growth and reproduction 7013-7021
Cacao—diseases and pests 7022-7049
Cacao—fermentation and by-products 7050-7052
Cashews 7053-7054
Coconuts 7055-7063
Coffee—general 7064-7070
Coffee—breeding, selection and culture 7071-7081
Coffee—diseases and pests 7082-7092
Coffee—harvesting and processing 7093-7098
Mangoes 7099-7105
Oil palms 7106-7108
Papaws 7109-7111
Pineapples 7112-7116
Rubber trees—general 7117-7120
Rubber trees—breeding, propagation and early growth 7121-7125
Rubber trees—soil management and nutrition 7126-7139
Rubber trees—tree destruction and diseases 7140-7145

INDEX OF CONTENTS—*continued*

	Nos.
Rubber trees—latex production and properties	7146-7166
Sugar cane—general	7167-7171
Sugar cane—breeding and varieties	7172-7180
Sugar cane—planting, nutrition and cultivation	7181-7195
Sugar cane—sugar and starch formation	7196-7197
Sugar cane—diseases and pests ..	7198-7213
Tea—general	7214-7218
Tea—propagation, environment and growth	7219-7226
Tea—diseases and pests	7227-7230
Tea—quality and composition ..	7231-7234
Sundry crops	7235-7239
NOTES ON BOOKS AND REPORTS Abstr. 47. Noted 9	7240-7295
Books	7240-7253
Annuals and reports	7254-7292
New periodicals	7293-7295

Total Abstracts 1321. Noted 379.

MISCELLANEOUS.

General.

5596. JAGER, J.
Příspěvek k otázce založení a vedení rostlinné dokumentace botanických zahrad a arboret **(A contribution to the problem of establishing and conducting a system of plant documentation in botanical gardens and arboretums.)** [English, Russian and German summaries 1 p. each.]
Věd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicich, 1961, No. 1, pp. 271-313, bibl. 7, illus.

Description of a system with practical examples.

5597. SCHNEE, L.
Plantas comunes de Venezuela. (**Common plants of Venezuela.**)
Rev. Fac. Agron. Venezuela, 1960, Alc. No. 3, pp. 663.

About 1,650 plants, wild and cultivated, described in alphabetical order of common names. An index of Latin names is appended.

5598. ADRIANCE, G. W.
Observations on horticulture in Brazil.
Ceiba, 1961, **9**: 55-8.

With particular reference to horticultural education and research.

5599. MISSISSIPPI AGRICULTURAL EXPERIMENT STATION.
1961 crop and fertilizer recommendations.
Miss. Fm Res., 1961, **24**(1): 3-6.

Including suitable varieties of vegetables, fruits, lawn grasses, sugar-cane and tung, based on research findings.

5600. VAN DEN MUIJZENBERG, E. W. B.
Organisation du travail en horticulture. (**Labour organization in horticulture.**) [English and German summaries ¾ p. each.]
Bull. Inst. agron. Gembloux, 1960, (hors Sér.) **1**: 169-79.

Recent improvements in tools, implements and labour efficiency are briefly reviewed, with examples of methods of saving time and labour.

5601. TAMMES, P. M. L.
Studies of yield losses. II. Injury as a limiting factor of yield. [Dutch summary ¼ p.]
Tijdschr. PlZiekt., 1961, **67**: 257-63, bibl. 9.

The relationship between injury and loss of yield is discussed, with horticultural examples. [For part I, see *H.A.*, 31: 1812.]

Climate and air pollution.

(*See also* 6298, 6539, 6884, 6885, 7273, 7287.)

5602. U.S. DEP. AGRIC., AGRICULTURAL RESEARCH SERVICE.
Plant hardiness zone map.
Misc. Publ. U.S. Dep. Agric. **814**, 1960, 1 folded sheet, 15 cts.

This useful map of the United States shows 10 temperature zones and, on the reverse, lists numerous indicator plants which thrive in them.

5603. KRONENBERG, H. G.
Het risicodragende karakter van de tuinbouwproduktie. (**The hazardous nature of horticultural production.**) [English summary 3 pp.]
Versl. landbouwk. Onderz. **67.2**, 1961, pp. 104, bibl. 82.

Climatic conditions are considered to be the main cause of the unstable market for horticultural produce in the Netherlands. In analyses of the production of apples, carrots and chrysanthemums, the risks resulting from climatic effects are evaluated. It is difficult to estimate the risks of horticultural production exactly, and, although technically risks can be reduced or eliminated, this is not always economically possible. For a perishable crop, however, control of climatic conditions is not a guarantee of stable prices.

5604. van Koot, Y., and Levert, C.
De eendaagse veranderingen in temperatuur en vochtigheid van de lucht op een drietal stations in Nederland. **(Day-to-day changes in temperature and air humidity at three stations in the Netherlands.)** [English summary 14 lines.]
Meded. Dir. Tuinb., 1961, **24**: 303-12, 330, bibl. 5.

Changes from day to day in maximum and minimum temperatures and in air humidity at 2 p.m. were noted, and their significance for horticulture, in particular for crops under glass, was evaluated. The data collected can, by means of nomographs, be used to predict possible changes in climatic conditions.—Proefst. Groent, Fruitt. Glas, Naaldwijk, and Kon. ned. met. Inst., De Bilt.

5605. Durand, R.
Les seuils de résistance aux gelées. Leur détermination, température de référence. **(The threshold values for frost resistance. Their determination, and related temperatures.)**
Mitt. Inform. Frostsch. Stuttgart-Hohenheim **6**, 1960, pp. 25-35, from abstr. in *Z. PflKrankh.*, 1961, **68**: 358.

The 4 stages in tissue death by freezing are described from observations with thermocouples in several types of plant tissue. Factors affecting the accuracy of thermometers are also discussed. Comparisons between meteorological data and frost injury to fruit trees indicate that the degree of injury can be related to the temperature recorded by a minimum thermometer at 40 cm. above ground level. It is shown that the threshold values for plant resistance to frost may be fairly well determined in the laboratory.

5606. Bouchet, R.
Quelques aspects théorétiques de la lutte contre les gelées notamment en ce qui concerne le procédé de lutte par aspersion. **(Some theoretical aspects of frost control, in particular control by sprinkler irrigation.)**
Mitt. Inform. Frostsch., Stuttgart-Hohenheim **6**, 1960, pp. 10-24, from abstr. in *Z. PflKrankh.*, 1961, **68**: 358.

The author discusses the principles of sprinkler irrigation used in frost protection. In an orchard in France the sprinkler apparatus was set to work at −1·5° C., when a wet-bulb thermometer registered 0° C. The author suggests that the critical temperature for switching on the sprinkler should be measured with a dry-bulb thermometer, and that the apparatus should be switched off when the temperature, as registered by a wet-bulb thermometer, is above the danger level.

5607. Balster, G.
Warnung bei Frost und Untertemperatur. **(Warning of frost and low temperature.)**
Gartenwelt, 1961, **61**: 128-9, illus.

A circuit for giving warning of frost or power failure is described.

5608. Arnold, C. Y.
Maximum-minimum temperatures as a basis for computing heat units.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 682-92, bibl. 5.

The calculation of degree-days from maximum and minimum temperatures is discussed from a graphic standpoint. A new method is proposed for estimating degree-days when the minimum temperature is below the base temperature. The effect of location and seasonal trends on the deviation of the mean temperature determined from the maximum and minimum and the true mean are discussed as sources of error. Procedures are suggested which will minimize these effects. The error remaining after these effects have been minimized is evaluated. It is shown to be small enough to suggest the use of a heat-unit system based on maximum and minimum temperatures in most commercial work and some types of research. [Author's summary.]—Univ. Ill., Urbana.

5609. Molotkovskij, Ju. G.
Metabolic characteristics of plants with reference to heat resistance. [Russian, with English summary 9 lines.]
Izv. Akad. Nauk SSSR, Ser. biol., 1961, No. 2, pp. 246-9, bibl. 6, illus.

The cells of the epidermis of pumpkin leaves exposed to 45° C. for 3 hours were plasmolysed by a 1 M sugar solution unless the cells were infiltrated with a respiratory inhibitor. Synthesis of amino acids in sunflower leaves was increased by exposure to 44° C. for 3 hours, except in the presence of a respiratory inhibitor. Heat treatment and dinitrophenol treatment both caused a sharp rise in the inorganic P content of tobacco leaves. Heat treatment reduced adenosine triphosphatase activity in the cytoplasm of pea and pumpkin leaves. It is suggested that high temperature disturbs the relationship between respiration and oxidative phosphorylation. [See also *H.A.*, 31: 3674.]

5610. Collins, B. G., and Taylor, R. J.
Conditions governing the onset of dew on large leaves.
Reprint from *Aust. J. appl. Sci.*, 1961, **12**: 23-9, bibl. 7.

When considering humidity conditions in the thin layer of air near a leaf surface, often important in disease control studies, it is necessary to take into account temperature, radiation and wind speed, particularly the last of these when it is low, as well as the ambient humidity. A theory is developed to predict 100% R.H., i.e. the onset of dew, at the surface of a thin leaf.—C.S.I.R.O., Melbourne.

5611. Hogg, W. H.
Measurements of the effect of shelter belts at Stockbridge House.
Exp. Hort., 1961, No. 4, pp. 62-7, illus.

Shelter belts (2 coniferous with a deciduous core, and 1 deciduous) planted in 1951-52 now reduce the run-of-wind to about 40% of that occurring in an open site.

5612. Newman, D. W.
A study of the mechanism(s) of fluoride-induced chlorosis.
Diss. Abstr., 1961, **21**: 2867, being *L.C. Card No. Mic.* 60-6233 of 81 pp.

In cultures of leaf tissue [species not stated] it was shown that fluoride reduces the leaf contents of chlorophyll, carotenoids and total ether-soluble Mg compounds. There was an increase in free amino-acids of the leaf without a concurrent change in the total N content per unit dry weight. The extent of fluoride-induced chlorosis was more closely correlated with the amount of P available to the plant than with the available Mg. Microscopic examination of fluoride-treated leaves revealed a disruption of the chloroplasts. The results obtained indicate that fluoride-induced chlorosis may be a result of protein-protected inactivation of the pigment system.—Univ. Utah.

5613. Freebairn, H. T., and Taylor, O. C.
Prevention of plant damage from air-borne oxidizing agents.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 693-9, bibl. 13.

Analytical data indicated that a spray application of reduced vitamin C to the foliage of plants caused an increase in their vitamin C content. Potassium ascorbate sprays partially protected pinto beans, petunias, celery, romaine [cos] lettuce, grapefruit, Cleopatra mandarin and Sampson tangelo from leaf injury caused by polluted air in and near Los Angeles. An increase in the weight and number of leaves on petunia plants was associated with the protection given by the vitamin C treatments. [Author's conclusions.]—Univ. Calif., Riverside.

Seeds.

(*See also* 5818-5820, 6067, 6236, 6323, 6352, 6362, 6578, 6582, 6584, 6721, 6813, 7109.)

5614. Slobodjanik, N. I.
Grading by specific gravity improves the quality of seeds. [Russian, with English, French and German summaries 6 lines each.]
Vestn. sel'sk Nauki, 1961, 6(4): 116-19, illus.

A more detailed account of work reported earlier [see *H.A.*, 30: 1505).

5615. Osborne, T. S., and Bacon, J. A.
Two improved and inexpensive systems for moisture stabilization in seeds or other tissues.
Plant Physiol., 1961, **36**: 309-12, bibl. 8, illus.

Two inexpensive systems for storing seeds or other tissues at constant relative humidities are described. Air flow is continuous, and vapour pressure is conditioned with a non-volatile compound (glycerol). Provision is made for easy checking and replacement of the conditioning liquid. Sample moisture is quickly ascertained with little or no interference to the system and without sample destruction. One system (plywood boxes) permits manipulation within the enclosed atmosphere; the other (glass tubes) affords easier sample measurement and virtually limitless sample numbers. [Authors' summary.]—Univ. Tenn., and Atomic Energy Commiss., Oak Ridge.

5616. Saljaev, R. K.
An apparatus for the surface sterilization and sowing of seeds. [Russian.]
Bot. Žurnal, 1961, **46**: 670-2, bibl. 1, illus.

In the laboratory.

5617. Rohloff, I.
Gesundheitsprüfungen an Saatgut. **(Tests for seed health.)**
Landw. Forsch. Sonderh. **12**, 1959, pp. 111-19, bibl. 12, illus.

The applications of several methods of seed testing are discussed with the aid of examples. The methods include macroscopic and microscopic observations on dormant seeds and on embryos, studies of seedlings, and tests with disinfectants to determine the degree of infestation by various organisms and the possibility of controlling them.

5618. Maruzzella, J. C., and Robbins, A. L.
Effect of essential oils on seed germination.
Naturwissenschaften, 1961, **48**: 383, bibl. 4.

Solutions of 56 essential oils were tested for their effect on germination and seedling growth of cucumber, radish, tomato, carrot and lettuce. The essential oils were grouped according to their main constituent, and the results showed that aldehydes (cinnamon) and ketones (*Thuja occidentalis*, pennyroyal) were the most active inhibitors of seed germination and seedling growth; phenols (clove, origanum, pimento, thyme), oxides (chenopodium) and esters (sweet birch, wintergreen) were intermediate in activity; terpenes (dill seed, niaouli), acids (valerian) and alcohols (linaloe wood) were least effective. When combinations of aqueous essential oils were used there was greater inhibition of radish seed germination and seedling growth than when each oil was used separately.—Long Is. Univ., N.Y.

5619. Poljakoff-Mayber, A., and Mayer, A. M.
Effect of thiourea on germination and growth.
Indian J. Plant Physiol., 1960, **3**: 125-38, bibl. 68.

A review.

5620. KARTHA, A. R. S., AND SETHI, A. S.
The mobilization of fat in germinating seeds. Mobilization of fat in germinating linseed and poppy seed.
Occurrence of free higher fatty acids in germinating seeds.
J. sci. industr. Res., India, 1958, **17C**: 34, bibl. 5; 104, bibl. 2; and 182-4.

Data for *Brassica* spp., *Luffa aegyptiaca*, *Sesamum indicum*, *Citrullus vulgaris*, *Hibiscus esculentus*, *Cucumis sativus*, *Momordica charantia* and *Cucurbita pepo.*

5621. HABER, A. H., AND CARRIER, W. L.
Pigment formation and photosynthesis in dormant lettuce seeds.
Plant Physiol., 1961, **36**: 351-3, bibl. 9.

Lettuce seeds, prevented from germinating by maleic hydrazide, can develop chloroplasts in an internal sector of cotyledons exposed to light. Chlorophyll and carotenoid-like pigments can be extracted from such seeds. These seeds perform a light-dependent fixation of C^{14}-bicarbonate, with radioactivity appearing in sucrose, sugar phosphates, and amino and keto acids. Similarly treated dark-imbibed control seeds do not develop chlorophyll or the capacity for photosynthesis. These findings furnish an instance of tissue differentiation in dormant seeds that is both anatomical and physiological. [From authors' summary.]—Oak Ridge nat. Lab., Tenn.

5622. PEARSON, R., AND PARKINSON, D.
The sites of excretion of ninhydrin-positive substances by broad bean seedlings.
Plant and Soil, 1961, **13**: 391-6, bibl. 3.

Ninhydrin-positive substances include amino acids, organic amines, polypeptides and ammonia, with the probable high predominance of amino acids in the case of root exudates. Such substances were excreted mainly from the micropyle of broad bean seeds when first sown, the excretory area spreading over the whole exterior after 1 day, and then rapidly decreasing until radicle emergence, when the meristematic region of the radicle, and finally the piliferous zone, became the active excretory area.—Hartley bot. Labs, Univ. Liverpool.

5623. VERONA, O.
Notizie sulla spermosfera. (**Notes on the spermosphere.**) [English summary ½ p.]
Ann. Fac. Agrar., Pisa, 1960, **21**: 71-88, bibl. 41, illus.

A review, defining the spermosphere as the zone of biological influence of the seed in its germination medium, and summarizing recent Italian and other work on the "seed effect", i.e. the influence of germinating seeds on the microflora and enzymes in the soil.

Propagation and nursery methods.

(*See also* 6962, 6999, 7264.)

5624. ROBERTS, J. R., AND BROWN, R.
The development of the graft union.
J. exp. Bot., 1961, **12**: 294-302, bibl. 1.

A new method is described for the examination of graft formation. The method depends in principle on the measurement of the tensile strength of the graft at intervals of 2 days. It has been applied to the analysis of the development of a simple graft, made by cutting across an internode of a tomato seedling and rejoining the separated portions. The method requires that the treatment be applied to a group of a hundred seedlings from which samples are taken at intervals of 2 days. With this general technique and with the system used it has been shown that the development of the graft continues steadily after the second day of the experiment, that graft formation is most rapid when the different tissues of the stem coincide in the stock and the scion, and that the tensile strength of the graft is markedly reduced when the turgidity of the tissues is depressed. [From authors' summary.]—Univ. Edinburgh.

5625. WAXMAN, S., AND WHITAKER, J. H.
A light operated interval switch for the operation of a mist system.
Progr. Rep. Storrs agric. Exp. Stat. **40**, 1960, pp. 5, illus.

See *H.A.*, 30: 4798.

5626. MEYER, E.
Erfahrungen bei der Steckholzvermehrung. (**Propagation by cuttings.**)
Gartenwelt, 1961, **61**: 186-7.

An oil emulsion, Alboleum, in water (1:40), used as a dip before inserting cuttings, increased the rooting of many species, including *Pyrus serotina*, *Prunus myrobalana*, mulberry, plane, *Populus* spp. and *Lagerstroemia indica.*

5627. STOFFERT, G.
Untersuchungen über das Ein- und Austopfen von Levkojen in Tontöpfen, Jiffy-Töpfen und Multitöpfen. (**Studies on potting stocks in clay pots, Jiffy pots and Multipots.**) [English and French summaries ½ p. each.]
Gartenbauwiss., 1960, **25**: 303-32, bibl. 2, illus.

The motions of potting up and potting on stocks in 3 types of pot were analysed, and these are described with the bench organization required for each type of pot. The time required for potting 1,000 plants was reduced as the total plant number increased to about 10,000, above which there was little change. Transport arrangements within the nursery also affected labour requirements. In general the 5-cm. clay pots demanded the most labour, the 5-cm. Multipots required the least and the Jiffy pots were intermediate. Average costs of potting 1,000 plants were lowest for clay pots, but were not much higher with Multipots. Jiffy pots were the most expensive, but better growth in these pots was some compensation.—Inst. gärtner Betriebsl., tech. Hochsch., Hannover.

5628. GOODLAND, N. L.
Method study on a pot plant nursery.
Gdnrs' Chron., 1961, **149**: 274-5, illus.

Reorganization of nursery methods of potting [see also *H.A.*, 31:3801] and preparation for marketing.

Soil composts and soil amendments.

(*See also* 6667.)

5629. BUNT, A. C.
Some physical properties of pot-plant composts and their effect on plant growth. I. Bulky physical conditioners.
Plant and Soil, 1961, **13**: 322-32, bibl. 11.

The effect of peat and grit on the physical properties of composts made from soils of different structural properties has been examined. Peat was beneficial in giving improved physical properties to the composts, better vegetative growth of tomato and antirrhinum and also earlier flowering with tomato. It had, however, no significant effect on the total yield of tomato fruit. Peat also eliminated a sterilizing toxicity in a chalky boulder clay. Measurement of macro-pore volume gave the best physical assessment of the mixtures with respect to vegetative growth, but the extent to which the improved growth was dependent on the physical property or to some inherent property of the peat has not been determined. Grit was not such a good physical conditioner from either a plant growth or physical point of view as peat. The size of the grit over the range 0·5–1·0 to 3·0–5·0 mm. did not cause any significant change in the physical properties of mixtures when used in the proportions 60 soil, 25 well-granulated peat, 15 grit. [Author's summary.]—John Innes Inst., Bayfordbury, Hertford.

5630. WATERS, W, E.
The effects of potassium source and soil mixtures on leaching of fertilizer salts from clay pots.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 384-9, bibl. 11.

The loss of nutrients through leaching was investigated in 3 potting mixtures composed of sandy soil and peat in various proportions, using 4 sources of K and ammonium nitrate at low and high levels plus superphosphate. The nutrients were either mixed with the soil or distributed on the surface. Losses in all cases were greater when the fertilizers were mixed with the soil, the equivalent of 7·75 acre/inches of water removing 71·5% of the P and 99·6% of the ammoniacal N. The greater part of the loss occurred in the first ¼ or ½ in. of leachate. The source of K significantly affected the loss of both K and P, KCl resulting in the greatest loss. The concentration of the leachates also increased as the amount of peat in the mixture was raised.—Gulf Coast Exp. Stat., Bradenton.

5631. MCCABE, M.
Mobile processing unit speeds soil operations.
Amer. Nurserym., 1961, **114**(2): 13-14, illus.

A machine for mixing soil composts on a large scale, used on a nursery for container-grown plants.

5632. ANON.
New soil cover cuts cost of steam sterilizing.
Amer. Nurserym., 1961, **113**(9): 87, 89.

A new lightweight fabric of vinyl plastic and industrial nylon, Herculite 20, is used as a cover in soil steaming in a nursery in New Jersey. Seed boxes are filled with soil, stacked above perforated steam pipes and covered with the sheet. The material has survived 85 treatments and is still serviceable.

5633. BAUMANN, E.
Kompostierung verschieden zerkleinerter und belüfteter Abfälle des Gemüsebaues. (**Composting differently shredded and aerated vegetable residues.**) [Russian and English summaries ¼ p. each.]
Arch. Gartenb., 1961, **9**: 50-65, bibl. 10, illus.

Vegetable residues (mostly from cabbage, celeriac and carrot), when shredded before composting sometimes became compacted, producing anaerobic conditions; these were eliminated by turning the compost several times. After 1½ years there were no external differences between composts of shredded and non-shredded materials, although initially losses of organic materials and carbohydrates were smaller in shredded than in non-shredded materials. In pot studies compost from non-shredded, non-aerated materials gave slightly better results than other types. Seedlings of various vegetables grew slightly better with aerated compost than with non-aerated compost, and with compost of shredded materials rather than that of non-shredded materials. In field trials white cabbage did not respond to compost applications, and although yields of lettuce were increased there was no difference between their response to the type of compost applied. Vertical air shafts in compost heaps have only a small effect and are not necessary.—Inst. Gemüseb., Grossbeeren.

5634. Bovay, E.
Élimination et utilisation des gadoues de ville. I. Incinération et compostage. II. Les divers procédés de compostage et l'utilisation de compost de gadoues en agriculture. (**Elimination and use of town refuse. I. Incineration and composting, II. The various systems of composting and the use of refuse compost in agriculture.**)
Rev. romande Agric. Vitic., 1961, **17**: 17-19, illus., and 36-40, bibl. 17, illus.

Horticultural uses of the compost include soil improvement, making hotbeds and erosion control in vineyards.

5635. de Groote, R.
Le compost de ville. (**Town-waste compost.**)
Courr. hort., 1961, **23**(5): 23, 33.

Properties and horticultural uses.

Water and irrigation.

(*See also* 6366, 7288.)

5636. Knickmann, E., and Tepe, W.
Bodenversalzung als Wasserfrage im Topfpflanzenbau und Gewächshaus. (**Soil salinity caused by the water applied to potted and greenhouse plants.**) [English, French and Spanish summaries 7 lines each.]
Mitt. Klosterneuburg, Ser. B, 1960, **10B**: 1-4, bibl. 3.

Hardness of water and its elimination, the salts content of water supplies and inadequate porosity of the soil are discussed.

5637. Klougart, A.
Vandingsvand til potteplanter. (**Irrigation water for pot plants.**) [English summary ¼ p.]
Horticultura, 1961, **15**: 110-15, illus.

The problems of watering with hard water and how they may be overcome are discussed.

5638. Rybář, E.
Příspěvek k řešení mechanizace spodní závlahy hrnkových rostlin. (**A contribution to the problem of mechanizing the sub-irrigation of pot plants.**) [English, Russian and German summaries ½ p. each.]
Věd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 227-34, bibl. 5, illus.

Wooden greenhouse benches were lined with resin-coated, tarred paper and filled to a depth of 5 cm. with fine brick rubble followed by a 2–3-cm. layer of fine sand on which the pots were placed. A constant water level was maintained with the aid of a small glass tank fitted with a ball valve.

5639. Ministry of Agriculture, London.
Introducing outdoor irrigation.
Adv. Leafl. Minist. Agric., Lond. **487**, 1960, pp. 7, illus.

Information on the source of water, types of sprinkler equipment, pipe layout and grant aid.

5640. Heissner, A.
Überprüfung verschiedener Methoden der Bodenfeuchtigkeitsmessung bei Beregnungsversuchen. (**Comparative tests with several methods of soil moisture measurement for irrigation studies.**) [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1961, **9**: 26-49, bibl. 25, illus.

Four methods for the indirect measurement of soil moisture were studied, namely those using electrical resistance units, calcium carbide, tensiometers and thermal conductivity. Their reliability and accuracy for use in irrigation experiments were determined in conjunction with the drying-chamber method, which was used as a standard. The following order of efficiency was obtained: 1. calcium carbide, 2. thermal conductivity, 3. tensiometer, 4. electrical resistance. The tensiometer and calcium carbide methods are considered to be most suitable for practical use in horticulture.—Inst. Gartenb., Grossbeeren.

5641. Janes, B. E.
Estimation of potential evapotranspiration (P.E.) from vegetable crops from net solar radiation.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 582-9, bibl. 12.

Net radiation measured by a Gier and Dunkle radiometer and the difference in loss of water from black and white Livingston atmometers were highly correlated. A regression equation for estimating net radiation from difference in loss of water from black and white atmometers (B − W) was developed. Assuming that the major portion of net radiation is utilized in evaporation of water from plants and soil, it is possible by use of latent heat of vaporization of water to calculate potential evapotranspiration (P.E.) from measured values of radiation received at plant height. Potential evapotranspiration measured from Thornthwaite evapotranspirometers was slightly less than P.E. estimated from net radiation. P.E. was close to open pan evaporation. Actual P.E. measured from field grown crops varied from 69 to 90% of estimated P.E. [Author's summary.] The work reported here formed part of a study on means of predicting the amount and frequency of irrigation required by vegetable crops in the N.E. United States. The vegetables used in the investigations on P.E. were beans, cabbages, celery and tomatoes. —Univ. Conn., Storrs.

5642. Letey, J., and Blank, G. B.
Influence of environment on the vegetative growth of plants watered at various soil moisture suctions.
Agron. J., 1961, **53**: 151-3, bibl. 11.

At high soil moisture suction values there was a greater reduction in vegetative plant growth when the environment caused high evapotranspiration than when the evapotranspiration was low. Transpiration diminished as soil moisture suction increased, regardless of environment, but under conditions of high evapotranspiration the reduction in transpiration was relatively greater. Regardless of environment, less water was used per unit dry weight produced when watering was delayed until higher suctions. [Authors' summary.] Sunflowers and beans were the test plants used in these experiments.—Univ. Calif., Los Angeles.

5643. Flocker, W. J.
Spring removal by winter cover crops of moisture from a compacted soil.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 705-9, bibl. 8.

Soil compaction is apt to be a serious problem in the vegetable areas of California. Compaction by machinery occurs in the summer and autumn, when crops are harvested from soil moistened by irrigation, and again in the spring, when the soil is still wet from winter snow and rain. Investigations on 14 winter cover crops indicated that several legumes planted on compacted soil yielded too little to justify their use for this purpose. Sod grasses lowered the soil moisture content more than the other grasses tested, but, when yields of the cover crops and their effects on soil structure are also considered, cereal grasses would seem to be more satisfactory.—Univ. Calif., Davis.

Nutrition.

(*See also* 6331, 6332, 7248.)

5644. Caldwell, J.
Further evidence of polar movement of nutrients in plants.
Nature, 1961, **190**: 1028-9, bibl. 3, illus.

The bases of rooted coleus cuttings were slit longitudinally from below, the tops of the cuttings being left intact; half the roots were set in sand and the other half in a rich loam, the two media being divided by a sheet of glass. Growth and development on the loam side were far greater than on the sand side, thus indicating that nutrients were retained by the tissues on the side on which they were absorbed.—Univ. Exeter.

5645. Heintze, S. G.
Studies on cation-exchange capacities of roots.
Plant and Soil, 1961, **13**: 365-83, bibl. 36.

Values are included for the roots of peas, cress, cabbage, beetroot and marrows, and confirmation of the importance of pectin in cation exchange phenomena of roots is evident.—Rothamsted exp. Stat., Harpenden, Herts.

5646. Jones, L. H.
Aluminium uptake and toxicity in plants.
Plant and Soil, 1961, **13**: 297-310, bibl. 21.

Although high levels of soil Al are usually confined in nature to acid conditions, samples of fly-ash (pulverized coal ash from power stations) with a pH range of 6·45–9·01 contained plant-available Al at levels of 24–710 p.p.m. Experiments with the roots of plants sensitive, tolerant and semi-tolerant (peas) to Al indicated that tolerance depended on the plant's ability to immobilize the Al by exudation of organic acids, the chief ones, in descending order of activity, being citric, oxalic, tartaric and malic. Chromatograms of the roots of mustard (Al-tolerant) plants grown in fly-ash with and without various proportions of soil showed that citric, oxalic and malic acids had fixed the Al. In another experiment comparing soil and fly-ash as media, brussels sprouts (semi-tolerant to Al) were unable to maintain their P status on the ash, whereas in mustard the P reduction was negligible in spite of a much higher Al uptake.—Univ. Birmingham.

5647. Škol'nik, M. Ja., and Solov'eva, E. A.
On the physiological role of boron. I. Correction of boron deficiency with nucleic acid. [Russian, with English summary 12 lines.]
Bot. Žurnal, 1961, **46**: 161-73, bibl. 54, illus.

Sunflower seedlings in nutrient culture without B grew poorly, but when RNA was added to the solution growth was similar to that with B. The addition of germanic acid to the nutrient solution did not alleviate B deficiency symptoms in sunflower and bean seedlings, and a high concentration of Mg had only a very slight effect. A hypothesis is advanced according to which the dying off of the growing points in B-deficient plants is caused by disturbances in the nucleic acid metabolism.

5648. Humphries, E. C.
Boron and adventitious root formation.
A.R. Rothamsted exp. Stat. 1960, 1961, pp. 101-2.

Dwarf french bean plants were grown at 20° [C.] in soil in cabinets lit by fluorescent tubes with a 16-hour photoperiod. When the first pair of leaves was fully expanded the hypocotyls were cut and placed in nutrient solution with or without boric acid. In addition to light from fluorescent tubes, some plants received light from incandescent lamps either before or after the hypocotyls were cut, or throughout both periods or during neither period. After 14 days the numbers of roots and root initials on the hypocotyls were counted, and the roots cut off and weighed. Incandescent light given before or after the hypocotyls were excised decreased the number and weight of adventitious roots on plants without B, but had no effect on root formation on plants given B. Or, in terms of B action, B had little effect on plants illuminated with fluorescent light only, but lack of B decreased root formation by plants that received supplementary incandescent light [see also *H.A.*, 31: 3656]. The growth in dry weight of the hypocotyls without B was decreased by incandescent light given before, but not after, the hypocotyls were cut. [Form author's report.]

5649. Abutalybov, M. G., and Džangirova, Š. G.
Translocation of calcium in plants. [Russian, with English summary 7 lines.]
Fiziol. Rast., 1960, **7**: 558-63, bibl. 5.

In lilac, Chinese rose and some other plants Ca^{45} moved upwards, mainly in the stem cortex but also to some extent in the wood. Saturation of the upper leaves and shoots with Ca by spraying with $CaCl_2$ induced a certain amount of downward movement in addition to the more general upward movement.

5650. Taylor, G. A., Moore, J. N., and Drinkwater, W. O.
Influence of 2,3,5-triiodobenzoic acid, indole-3-acetic acid and method of sample collection on translocation of foliar applied radiocalcium.
Plant Physiol., 1961, **36**: 360-3, bibl. 8.

With a view to increasing the mobility of foliar-applied Ca, the effect of growth substance sprays prior to the application of Ca was studied on tomato plants. Neither TIBA nor IAA sprays increased the translocation of foliar-applied Ca^{45}. In a further experiment pre-treatment with a calcium gluconate spray showed that translocation was not affected by the total Ca concentration on the leaf surfaces.—N.J. agric. Exp. Stat., Rutgers.

5651. Heras, L.
Potencial de óxido-reducción en clorosis férrica inducida. (**The redox potential in induced iron chlorosis.**) [English summary ⅔ p.]
An. Estac. exp. Aula Dei, 1960, **6**: 136-65, bibl. 36, illus.

Changes in the redox potential of chlorotic pear leaves from trees growing on calcareous soil were studied after injection of 0·025% ferrous sulphate into the leaf veins, and after darkening the leaves. Both treatments raised the redox potential above that of untreated leaves, and both resulted in chlorophyll formation, but the effects of darkening were reversed on re-exposure to light. The ratio of *a* to *b* chlorophylls was lowered by Fe injection to the normal value for green leaves, but darkening resulted in subnormal values. [See also *H.A.*, 31: 66.)

5652. Heras, L.
Polifenoles en casos de deficiencia inducida de heirro. (**Polyphenols in cases of induced iron deficiency.**) [English summary ¼ p.]
An. Estac. exp. Aula Dei, 1960, **6**: 166-72, bibl. 6, illus.

In normal pear leaves the distribution of polyphenols was uniform, but in those affected by lime-induced chlorosis the inter-veinal tissues were lacking in polyphenols. Darkening the chlorotic leaves for 14 days left even the veins almost devoid of polyphenols, but restored much of the leaf colour. Re-exposure to light for 10 days led to renewed chlorosis and accumulation of polyphenols in the veins. Injection of 0·025% ferrous sulphate into a vein induced a slight accumulation of polyphenols in the veins, followed several days later by localized chlorophyll formation and very marked polyphenol accumulation in a small area surrounding the injection point. The parts played by Fe and polyphenols in maintaining chlorophyll activity are discussed.

5653. Brown, J. C., Tiffin, L. O., and Holmes, R. S.
Competition between chelating agents and roots as factor affecting absorption of iron and other ions by plant species.
Plant Physiol., 1960, **35**: 878-86, bibl. 25, illus.

See *H.A.* 31: 1720 and 3658.

5654. Stenuit, D., and Piot, R.
Mangaangebrek en mangaanvergiftiging bij landbouwgewassen. (**Manganese deficiency and toxicity in agricultural crops.**) [French English and German summaries.]
Reprint from *Agricultura*, 1960, **8**: 141-72, bibl. 14, illus.

The sensitivity of several crops (including beans, tomatoes, peas, spinach, leeks, onions, chicory, apples, pears, plums, peaches and cherries) to Mn deficiency has been determined. Fruit trees showing symptoms of Mn deficiency were more susceptible to spray damage than were healthy trees. In Mn-deficient plants mineral uptake was higher than normal, but less organic material was formed. Toxicity symptoms show some similarity to those of a deficiency. Crops susceptible to toxicity include beans, leeks, onions, chervil, lettuces, tomatoes and tobacco.—Bodemk. Dienst, Heverlee.

5655. Stenuit, D., and Piot, R.
Symptômes de carence et de toxicité en manganèse chez les plantes agricoles et horticoles. (**Symptoms of manganese deficiency and toxicity in agricultural and horticultural plants.**) [In French and Flemish.]
[*Publ.*] *Serv. pedol. Belg., Heverle*, 1960, pp. 47, bibl. 3, illus.

Brief notes on factors affecting the appearance of symptoms, control measures, deficiency symptoms in crops including vegetables, tree fruits, vines, red currants, roses and tobacco, and toxicity symptoms in crops including beans, beet and tobacco. The symptoms are illustrated by coloured photographs. [See also *H.A.* 30: 37.]

5656. BETTO, E.
Attività di ricerca del "Laboratorio Radioisotopi" dell'Istituto di Patologia Vegetale dell'Università di Milano. (**Investigations at the Radioisotope Laboratory of the Institute of Plant Pathology at the University of Milan.**) [English summary 10 lines.]
Reprint from *Minerva nucl.*, 1959, **3**: 370-3, bibl. 11.

Studies on tobacco. *Datura stramonium* and *Phaseolus vulgaris* have included P absorption through roots and leaves of healthy plants, and P metabolism in injured leaf tissue and in leaves infected by an obligate parasite (*Uromyces appendiculatus* on *P. vulgaris*).

5657. CORGAN, J. N.
The relationship between moisture stress and the uptake and translocation of phosphorus by plants.
Diss. Abstr., 1961, **21**: 2428, being *L.C. Card No. Mic.* 60-6800 of 132 pp.

There was no effect of drought at any period of the year on the percentage of P in the leaves of apple seedlings. A highly significant interaction was found between the cationic composition of the soil (Ca, K and Na contents), moisture stress and P uptake, and the primary effect of moisture stress in reducing uptake to the plant tops was very large. The uptake of radioactive P from a nutrient solution by young tomato plants was reduced when transpiration was reduced. [The work on beans has already been abstracted in *H.A.*, 31: 2431.]—Univ. Mo., Columbia.

5658. UZORIN, E. K.
Migration of the isotopes S^{35} and P^{32} between higher plants and algae. [Russian.]
Bot. Žurnal, 1961, **46**: 731-3, bibl. 5.

Compounds containing S^{35} and P^{32} were applied to the leaves of certain plants, including peas, grown in soil or water cultures to which in some cases algae were added. The labelled elements were found to be translocated from the treated to untreated plants and from the higher plants to the algae and back again. [See also *H.A.*, 31: 3700.]

5659. CHARLIERS, N. J.
Importanza dello zolfo nell'agricoltura. (**The importance of sulphur in agriculture.**)
Progr. agric., Bologna, 1961, **7**: 489-603, illus.

A review, covering S in plant nutrition, S-deficiency symptoms, determination of S requirements, toxicity, antagonism and synergism, the S balance in the soil, and the uses of S in plant protection.

Radioactive contamination.

5660. COHEN, —., AND GAILLEDREAU, —.
La pollution radioactive des sols: aspects et remèdes. (**Radioactive contamination of soils: aspects and remedies.**)
C.R. Acad. Agric. Fr, 1961, **47**: 226-9, bibl. 7.

In one soil contaminated by radioactivity removal of Sr^{90} to a depth of 1 m. required irrigation with about 90 m. of water or 7 m. of a 0·1 equivalent solution of Ca. Other substances which have been used successfully to inactivate Sr^{90} in the soil are acid potassium tartrate, ammonium citrate, and NaEDTA which is most effective at pH 10. Manuring with K reduced the accumulation of Sr^{90} by 58% in radish leaves and by 13% in the roots.

5661. GULJAKIN, I. V., JUDINCEVA, E. V., AND LEVINA, Ė. M.
Sr^{90} accumulation in plants in relation to its concentration in the soil. [Russian, with English summary $\frac{1}{4}$ p.]
Izv. Timirjazev. sel'sk Akad., 1960, No. 6, pp. 7-22, bibl. 13, illus.

Peas and table beet were used, together with several other species, in greenhouse experiments to compare the uptake of Sr^{90} from pure quartz sand, sandy loam and medium loam soils given different doses of Sr^{90}. Over the range 1×10^{-5} to 1×10^{-2} microcurie per kg. of soil it was found that uptake by beet and peas was almost directly proportional to the concentration of Sr in the soil. The ratio of Sr^{90}:Ca in the plants analysed was also directly related to the Sr^{90} level in the soil. At a given level of Sr^{90} in the soil, more of the element was absorbed from the pure sand than from either of the loam soils. [For earlier work in this series see *H.A.*, 30: 1532 and 3126.]

Soilless culture.

(*See also* 6466.)

5662. GÖHLER, F.
Die Überwachung und Regulierung von Nährlösungen bei der erdelosen Kultur von Gemüse unter Glas. (**The checking and regulation of nutrient solutions for the soilless culture of vegetables under glass.**) [Russian and English summaries $\frac{1}{2}$ p. each.]
Arch. Gartenb., 1961, **9**: 96-125, bibl. 36, illus.

Physical methods (measurement of electrolytic conductivity) and chemical methods (rapid determination of nitrate N, K, P, Fe and pH based on colorimetric and nephelometric reactions) were tested for their accuracy in determining the nutrient status of solutions. These methods were all found to give satisfactory results with solutions in which tomatoes, lettuces and cucumbers were grown. The author recommends that the nutrient status of the solution should be determined every 4 weeks, and that weekly nutrient additions should be made according to empirical observations. [For earlier work see *H.A.*, 31: 1729 and 1730.]—Inst. Gartenb., Grossbeeren.

5663. Dreibrodt, L.
Der Einfluss verschiedener Substrate auf den Ertrag von Gemüse in Hydrokultur. **(The effect of different substrates on the yields of vegetables in soilless culture.)**
Arch. Gartenb., 1961, **9**: 126-33, bibl. 9.

Piatherm, a urea-formaldehyde resin, has shown promise as a substrate for soilless culture when mixed with gravel. Radish and parsley were the test crops.—Inst. Obst- u. Gemüseb., Martin-Luther-Univ., Halle-Wittenberg.

5664. Meškov, N. V.
The total carbon content in root secretions of plants grown in sterile cultures with permanent and changed solutions. [Russian, with English summary ⅓ p.]
Izv. Akad. Nauk. SSSR, Ser, biol., 1961, No. 3, pp. 352-61, bibl. 18.

The root exudate of pea plants grown in sterile nutrient solutions for 80–90 days contained twice as much total carbon when the nutrient solution was changed 4 times during the experiment as when it remained unchanged. The carbon content of the exudate in the changed solution amounted to 10% of that of the whole plant, and in the permanent solution to 2·7–4·0%.

Tissue culture.

(*See also* 5673, 5696, 6647, 6850, 7063.)

5665. Clutter, M. E.
Chemical control of differentiation in plant tissue culture.
Diss. Abstr., 1961, **21**: 2084, being *L.C. Card No. Mic.* 60-6172 of 81 pp.

The effects of 3 plant hormones and 4 lignin precursors were studied with callus tissue of *Salix nigra* and pith tissue of *Nicotiana tabacum*.

5666. Street, H. E., Hughes, J. C., and Lewis, J. S.
Studies on the growth of excised roots. X. Individual amino acids and acid-hydrolysed casein as nitrogen sources for the growth of excised tomato roots.
New Phytol., 1960, **59**: 273-87, bibl. 38.

With and without nitrates or ammonium salts, and at pH 4·8 and 6·8. [For parts VIII and IX see *H.A.*, 30: 1541.]

Physiology and metabolism.

(*See also* 6277, 6238, 6355, 6465, 6467, 6532, 6719, 6777, 6948, 6949, 7015, 7273.)

5667. Finn, J. C., Jr., and Hamner, K. C.
Investigation of *Hyoscyamus niger* L., a long-day plant, for endodiurnal periodicity in flowering response.
Plant Physiol., 1960, **35**: 982-5, bibl. 8.

The flowering responses of *Hyoscyamus niger* which resulted from exposure to several light-dark cycles of different durations revealed a very pronounced inhibition of flowering in plants exposed to cycles of 24 and 30 hours' duration. Cycles either shorter or longer resulted in much greater flowering. In fact, this long-day plant could be caused to flower on short photoperiods if each photoperiod was associated with either a long or a short dark period, but with intermediate dark periods flowering was inhibited. In other words, darkness can either promote or inhibit flowering in *Hyoscyamus*, depending upon the duration of the light-dark cycle. [From authors' summary.]—Univ. Calif., Los Angeles.

5668. Lam, S. L., and Leopold, A. C.
Reversion and reinduction of flowering in perilla.
Amer. J. Bot., 1961, **48**: 306-10, bibl. 9, illus.

Plants of *Perilla crispa* ultimately revert to the vegetative state provided that they have received not more than about 20 cycles of short photoperiods. Reversion is markedly promoted by repeated debudding of plants induced with 35 cycles or less. Reverted plants of *Perilla* could be reinduced twice by photoperiodic treatment of the originally induced leaves. Timing experiments to measure the flow of flower stimulus from induced leaves suggest a gradual loss of the stimulus, as indicated by increased time to appearance of flowers and decreased flower number. It is concluded that, after the inductive treatment is withdrawn, the effectiveness of the flower stimulus coming from the leaf declines with time. It is suggested that reversion is made possible by the decline of effective flower stimulus coming from the induced leaves. [Authors' abstract.]—Purdue Univ., Lafayette, Ind.

5669. Čajlahjan, M. H., and Konstantinova, T. N.
The effect of anaerobic conditions on photoperiodism in plants. [Russian.]
Doklady Akad. Nauk. SSSR, 1960, **135**: 1539-42, bibl. 7, illus.

Plants in the vegetative stage, including the long-day species *Rudbeckia bicolor* and the short-day species *Perilla nankinensis* and *P. ocymoides*, were subjected to short-day treatment (i.e. high light intensity for 10 hours in a normal atmosphere, followed by 14 hours of darkness, during the beginning or end of which they were placed in an atmosphere of nitrogen for 5–8 hours. Similar plants were subjected to long-day treatment (i.e. high light intensity for 8–10 hours in a normal atmosphere, followed by anaerobic conditions at low light intensity for 4·5–7 hours, and then 8–10 hours of darkness in a normal atmosphere). Anaerobic conditions during the first 5–8 hours of darkness induced flower stem formation in *Rudbeckia*, and plants grown under anaerobic conditions during the last 5 hours of darkness also began to flower. In both species of *Perilla* anaerobic conditions during darkness retarded flowering. Anaerobic conditions in light inhibited flowering in *Rudbeckia* but had no effect on *Perilla* (although in 2 other short-day plants it advanced flowering).

5670. WASSINK, E. C.
Interaction of light, other external factors and genetic differences in formative effects in plants.
Publ. U.I.S.B. Colloque int. Photo-thermopériodism, Parma, 1957, **34 Ser. B,** pp. 75-88, bibl. 10, illus.

A review, mainly of work carried out at the Laboratory of Plant Physiological Research, Wageningen, on lettuce, cosmos and *Hyoscyamus niger*.

5671. THOMSON, B. F., AND MILLER, P. M.
Growth patterns of pea seedlings in darkness and in red and white light.
Amer. J. Bot., 1961, **48**: 256-61, bibl. 11.

Seedlings of peas were grown in vermiculite at 22° C. and exposed for 16 hours daily to red or white light or kept in darkness. Others were grown in soil in the greenhouse. Samples harvested daily for 16 days were dissected, the length of each internode and leaf was measured, and the total number of leaves and leaf primordia were counted. The form of the stem apex and youngest primordia and internodes was the same in light as in darkness. Leaf production was accelerated very slightly, and the growth of leaves and internodes was decidedly accelerated, by light. Leaf-leaf, leaf-internode and internode-internode correlations indicate that the morphogenetic effect of light is limited to the later stages of organ growth. Dry weight was consumed more rapidly in light than in darkness, probably because of more rapid growth and slightly greater amounts of respiring tissue in light-grown plants. [From authors' abstract.]—W. Va Univ., Morgantown.

5672. WHEELER, A. W.
Effect of light quality on the growth and growth-substance content of plants.
J. exp. Bot., 1961, **12**: 217-25, bibl. 8.

In peas and in french, broad and runner beans grown in cabinets illuminated by fluorescent light, the main effect of providing additional incandescent light was to increase the length of the internodes. Although leaf area was little affected, the incandescent light increased the dry weight of most of the plants. In dwarf french beans the longer internodes of plants grown with additional incandescent light was associated with, and perhaps a result of, the higher content of GA-like and IAA-like growth substances in the shoots. [From author's summary.]—Rothamsted exp. Stat., Harpenden, Herts.

5673. BUTENKO, R. G., NIČIPOROVIČ, A. A., AND PROTASOVA, N. N.
The physiological activity of the photosynthetic products of plants exposed to light of different spectral composition. [Russian, with English summary $\frac{1}{3}$ p.]
Fiziol. Rast., 1961, **8**: 153-60, bibl. 25, illus.

Leaf extracts were prepared from bean plants grown under either red, blue, white or day-light lamps, or a succession of some of these with or without CO_2 [see also *H.A.*, 31: 3678]. Extracts from plants grown for 14 days under blue or day-light lamps caused a much more intensive proliferation of carrot tissue cultures than did extracts from plants grown under red light; extracts from plants grown under white light showed an intermediate effect. Extracts from plants grown for 3 hours under blue light with CO_2 had a more stimulating effect on carrot tissue proliferation than those from plants grown without CO_2, but under red light the presence of CO_2 reduced, and its absence increased, the stimulating effect of the extract. It is concluded that during photosynthesis physiologically active compounds similar to vitamins or growth substances are formed, the properties and quantities of which are dependent on the spectral composition of the light.

5674. ÚLEHLA, J.
Correlative inhibition of formation of chlorophyll in the leaves of etiolated pea plants.
Nature, 1961, **191**: 613-14, bibl. 8, illus.

Young pea plants, grown in the dark, were decapitated above different nodes and the plants and the portions removed were placed in the light. Chlorophyll formation in the various parts was assessed after 24 hours. The results indicated that chlorophyll formation was inhibited in the leaf, even in the absence of the apex, if there was a younger node present, and that in the presence of the basal parts cholorophyll formation was stimulated. The implications of these findings and the concept of apical dominance are discussed.

5675. WALLACE, A., AND OTHERS.
Dark CO_2 fixation of virus-diseased, iron-chlorotic and genetic-chlorotic leaves.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 679-81, bibl. 5.

Dark CO_2 fixation was studied in virus-diseased and healthy camellia leaves and in yellow and green parts of variegated ivy. Comparisons were made with iron deficiency (previously reported [*H.A.*, 29: 3924]). In general, chlorotic leaves contained more organic acids, and had a higher rate of dark CO_2 fixation both *in vivo* and *in vitro* (PEP carboxylase) than did corresponding green or healthy leaves. The increase in organic acids was distributed mostly in citric and malic acids. [Authors' summary.]—Univ. Calif., Los Angeles.

5676. Bacon, J. S. D., Palmer, M. J., and DeKock, P. C.
The measurement of aconitase activity in the leaves of various normal and variegated plants.
Biochem. J., 1961, **78**: 198-204, bibl. 23.

Differences in activity were found in leaves of different ages from a range of vegetable and ornamental plants, and in the different parts of variegated leaves, but there was no consistent trend. [See also *H.A.*, 31: 1717.]—Macaulay Inst. Soil. Res., Aberdeen.

5677. Gunar, I. I., and Bogačeva, I. I.
The movement of chloroplasts in beans during the course of 24 hours and its relation to photosynthesis. [Russian, with English summary 10 lines.]
Izv. Timirjazev. sel'sk. Akad., 1961, No. 2, pp. 215-20, bibl. 18, illus.

The chloroplasts in the primary leaves of bean plants, grown in water culture at a 12-hour day length, moved to the side walls of the parenchyma cells by day and sank to the bottom by night. This movement was rhythmic and continued for 2 days after the day length had been increased to 24 hours.

5678. Litvin, F. F., Krasnovskij, A. A., and Rihireva, G. T.
The fluorescence of various forms of chlorophyll in plant leaves. [Russian.]
Doklady Akad. Nauk SSSR, 1960, **135**: 1528-31, bibl. 7.

Experiments with bean leaves are described which indicate that the fluorescence of the chlorophyll had maxima at 675, 682, 690-696 and 730 mμ, apparently associated with the different forms of the pigment. The various forms of chlorophyll in the leaves had fluorescences of different spectral structure at room and at low temperatures, and this made it possible to study the changes taking place during the formation and accumulation of chlorophyll in plants. [For earlier work, see *H.A.*, 30: 1544.]

5679. Humphries, E. C.
Growth of rooted detached leaves.
A.R. Rothamsted exp. Stat. 1960, 1961, p. 102.

When primary leaves of dwarf french bean were cut from the plant and kept in light with their petioles dipping in nutrient solution roots began to appear in 7 days. During this time growth in dry weight was small, but after roots appeared the rate of growth increased. When petioles were treated with IAA before they were placed in nutrient solution more roots were formed, and leaves so treated had a higher growth rate and net assimilation rate than leaves rooted in nutrient solution alone, However, the net assimilation rate of rooted leaves, even after treatment with IAA, was much below that of intact seedlings grown under the same conditions. These results indicate that the rate of photosynthesis depends on the rate at which photosynthetic products are used in growth. Adding kinetin to the nutrient solution suppressed root formation but induced a large growth of callus and decreased net assimilation rate only slightly below that of rooted leaves, showing that callus affects the rate of photosynthesis in the same way as roots. [From author's report.]

5680. Lake, J. V., and Slack, G.
Dependence on light of geotropism in plant roots.
Nature, 1961, **191**: 300-2, bibl. 4.

Observations on plants of China asters, stocks and cucumbers grown in opaque and transparent pots has shown that, in these plants, exposure to light is a prerequisite for geotropism of the roots.—Nat. Inst. Agric. Engng, Silsoe, Beds.

5681. Leinweber, F.-J.
Temperature coefficient of endodiurnal leaf movements in *Phaseolus*.
Nature, 1961, **189**: 1028, bibl. 11.

Evidence on temperature effects on the length of the cycle of leaf movement is briefly reviewed. The author reports that, after transfer to constant conditions, the Q_{10} was 1·2 for the first 2 cycles and subsequently became less, but he considers that the temperature effect on cycle length largely depends on the seedlings' previous treatment.—Johns Hopkins Univ., Baltimore, Md.

5682. Pierpoint, W. S.
Leaf mitochondria.
A.R. Rothamsted exp. Stat. 1960, 1961, p. 111.

Notes on extraction from tobacco leaves, and physiological activities. [For earlier work, see *H.A.*, 30: 3124 and 3760.]

5683. Pollock, B. M.
Studies of rest period. III. Respiratory changes in leaf primordia of maple buds during chilling.
Plant Physiol., 1960, **35**: 975-7, bibl. 7.

Measurements of respiration rate and respiratory response to 2,4-dinitrophenol were made at intervals during chilling and warm storage on leaf primordia from buds of *Acer saccharinum* trees. It was found that the respiration rate of buds from chilled trees rises as a result of previous low temperature exposure which breaks rest; respiration of unchilled buds drops during the same period. Dinitrophenol increases the respiration rate; the increase becomes greater with length of storage but is always less in chilled than in unchilled buds. Thus the efficiency of utilization of the respiratory enzyme system always remains higher in organs approaching growth than in those in which the rest period is not broken. This situation is similar to that in embryonic leaf primordia from cherry seeds [see *H.A.*, 30: 171], and suggests that it may be a more general phenomenon. [From author's summary. For part II, see *H.A.*, 31: 5820.]—Univ. Del., Newark.

5684. LETEY, J., AND OTHERS.
Plant growth, water use and nutritional response to rhizosphere differentials of oxygen concentration.
Proc. Soil Sci. Soc. Amer., 1961, **25**: 183-6, bibl. 13, illus.

Various O_2 level treatments were applied to snapdragons grown in cylinders by varying the O_2 concentration above the soil surface. Other soil physical properties were held relatively uniform during the experiment. The aerial portions, except for part of the stem, were isolated from the rhizosphere treatments. Eight treatments ranging from $< 1\%$ to 21% O_2 were applied. In general plant growth increased with higher O_2 levels. The relative content of P and K in the shoots increased with increasing O_2 concentration. The Na content increased with decreasing O_2 and showed a very marked increase at the lowest O_2 levels. Water use decreased with decreasing O_2. [Authors' abstract.]—Univ. Calif., Los Angeles and Riverside.

5685. KURSANOV, A. L.
Modern plant physiology and the prospects of its development. [Russian, with English summary ⅓ p.]
Izv. Akad. Nauk SSSR, Ser. biol., 1961, No. 2, pp. 181-201, illus.

Developments in the major branches of Soviet plant physiology in the last 20 years are reviewed, with particular reference to the elucidation of nitrogen metabolism in the root system. Work on the effects of soil drought and hot dry winds on the normal pattern of N metabolism is also considered.

5686. IBRAHIM, R. K., LAWSON, S. G., AND TOWERS, G. H. N.
Formation of labeled sugars from L-tyrosine-C^{14} in some higher plants.
Canad. J. Biochem., 1961, **39**: 873-80, bibl. 12, illus.

Radioactive sugars and organic acids, including glutamic and aspartic acids, were synthesized in leaf disks of 5 species (including pear and *Pelargonium*) of angiosperms from administered, uniformly labelled L-tyrosine. The synthesis of sugars was appreciable in light; in the dark there was virtually no conversion to carbohydrate. In three different experiments 28%, 36% and 46% of the total activity of tyrosine-U-C^{14}, administered to leaf disks of pear, could be accounted for in identifiable aliphatic compounds. These results indicate that tyrosine is a glucogenic amino acid in higher plants and suggest also that 3 or more carbons of the tyrosine molecule are utilized. Ring cleavage is a possibility. [From authors' abstract.]—McGill Univ., Montreal.

5687. WALKER, W. S.
The effects of mechanical stimulation and etiolation on the collenchyma of *Datura stramonium*.
Amer. J. Bot., 1960, **47**: 717-24, bibl. 14, illus.

Cell-wall thickening in the collenchyma of the internodes and petioles of *Datura stramonium* was markedly increased by mechanical shaking of the plants, and was reduced by an average of 60% after keeping the plants in darkness for 12 or more days. —Grinnell Coll., Iowa.

5688. WALDRON, J. D., AND OTHERS.
Further observations on the paraffins and primary alcohols of plant waxes.
Biochem. J., 1961, **78**: 435-42, bibl. 18, illus.

With data for apple peel, leaves of certain brassicas, beans and tobacco and rose petals.

Growth substances.

(*See also* 5819, 5879-5881, 5902, 5904, 5905, 5907, 5912-5915, 5920, 5961, 6028, 6031, 6287, 6327, 6354, 6395, 6460, 6461, 6519, 6534-6536, 6609, 6629, 6642, 6670, 6671, 6690, 6728, 6805, 6810, 6813, 6842, 6881, 6942, 6963, 6999, 7001, 7113-7115, 7151-7156, 7214, 7220, 7273.)

5689. BYRDY, S., PĘCZAK, J., AND SZYMURA, W.
Szybka metoda oceny aktywności biologicznej roślinnych substancji wzrostowych. (**A rapid method for evaluating the biological activity of plant growth substances.**)
Przem. Chem., 1959, No. 6, pp. 378-81, illus., from *Polish tech. Abstr.*, 1960, No. 2 (38), Abstr. 6513.

It is suggested that the direct relationship found between the reduction in germination percentage of white mustard (*Sinapis alba*) seed and the concentration of growth substance applied could be used for the bioassay of these substances.

5690. GLASZIOU, K. T., SACHER, J. A., AND MCCALLA, D. R.
On the effects of auxins on membrane permeability and pectic substances in bean endocarp.
Amer. J. Bot., 1960, **47**: 743-52, bibl. 38, illus.

Including delayed senescence. [For earlier work see *H.A.*, 29: 2093e.]

5691. HALLAWAY, H. M.
Ageing in higher plants.
Reprint from *New Scientist*, 1960, **8**: 1243-5, illus.

Parts of the surfaces of cherry leaves treated with drops of 2,4-D or indole-aceto-nitrile (IAN) [concentrations not stated] in the early autumn remained green even after leaf fall, whereas the untreated areas changed colour and finally died. The treatment postponed protein breakdown and prolonged photosynthesis for 14-16 days. Brief reference is made to the retardation by dilute IAA, NAA and 2,4-D solutions of citrus fruit ripening, and to the acceleration of ripening in apples, peaches, pears, bananas and figs by 2,4-D at higher concentrations.—Dep. Bot., Oxford Univ.

5692. PURVES, W. K., AND GALSTON, A. W.
Interaction of sugars and auxins in pea epicotyl section growth.
Amer. J. Bot., 1960, **47**: 665-9, bibl. 15.

The nature and magnitude of the response of etiolated pea-epicotyl sections to auxin were determined by the concentration of sugar in the growth medium. For example, the concentration of IAA inducing maximum elongation moved through at least 3 orders of magnitude in response to varying sucrose concentrations, from approximately 10^{-4} M with no sucrose to 10^{-7} M with 2% sucrose. Similarly, the inhibitory action of high levels of IAA on elongation occurred only in the presence of sucrose. By contrast, although sucrose also promoted water uptake, it only slightly affected the IAA optimum for this process. The action of IAA on growth could be detected immediately, but the growth response to sucrose occurred only after a 6–8-hour lag. If tissues were supplied with sucrose, then 1-hour exposures to IAA could be as effective on growth as continuous 20-hour exposures, depending upon the time at which such exposures were given. Thus, 10^{-4} M IAA applied in the presence of 2% sucrose was markedly inhibitory to elongation in hours 1 to 3, relatively inactive in hours 4 to 6, and strongly promotive after hour 7. The change from inhibitory to promotive action thus coincided in time with the length of the lag period for sucrose action. [From authors' abstract.]—Yale Univ., Conn.

5693. MARTH, P. C., AND MITCHELL, J. W.
Plant growth suppressants with special reference to persistence of Amo-1618 in soil.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 673-8, bibl. 11, illus.

When Amo-1618 was applied to a greenhouse soil at rates of 1, 10 and 100 lb./acre, and successive crops of beans were grown in 9 subsequent years, the depressing effect of this quaternary ammonium compound on internode length persisted for 4 years at the 1-lb. rate and for at least 9 years at the 10- and 100-lb. rates [see also *H.A.*, 30: 1564]. After the depressing effect of the 1-lb. rate wore off, a slight stimulatory response occurred and subsequent crops of beans up to the 9th year had more intense green foliage and lived longer than untreated control plants. When Amo-1618 was applied at 0, 1, 5 and 25 lb./acre to chrysanthemums growing in the open, reductions in height were most pronounced at the higher concentration, but the response was greater in tall and moderately tall varieties than in a dwarf variety. Bean plants grown 1 year later in the same soil showed marked reduction in height, especially where 5 and 25 lb./acre of Amo-1618 had been applied. Observations suggest that the long persistance of Amo-1618 in soil may be partly accounted for by the fact that it is strongly bound by colloidal surfaces and also by its inherent bacteriostatic and fungistatic properties.—U.S.D.A., Beltsville, Md.

5694. KLINGENSMITH, M. J.
The effect of certain benzazole compounds on plant growth and development.
Amer. J. Bot., 1961, **48**: 40-5, bibl. 22, illus.

See *H.A.*, 30: 3155.

5695. WITTWER, S. H., AND TOLBERT, N. E.
2-Chloroethyl trimethylammonium chloride and related compounds as plant growth substances. V. Growth, flowering and fruiting responses as related to those induced by auxin and gibberellin.
Plant Physiol., 1960, **35**: 871-7, bibl. 17.
WITTWER, S. H.
Eine neue Gruppe von Wuchsstoffen und einige ihrer Wirkungen auf die Pflanze im Vergleich zu denen von Auxin und Gibberellin. (**A new group of growth substances and some of their effects on the plant in comparison with those of auxin and gibberellin.**) [English and French summaries 9 lines each.]
Gartenbauwiss., 1960, **25**: 236-48, bibl. 40, illus.

See *H.A.*, 31: 1771. [For part IV see *H.A.*, 31: 1044.]

5696. MÉNORET, Y.
Action de l'acide 2.4.dichlorophénoxyacétique sur le métabolisme azoté des tissus de carotte cultivés *in vitro*. (**The action of 2,4-dichlorophenoxyacetic acid on the nitrogen metabolism of carrot tissues grown *in vitro*.**)
Ann. Inst. nat. agron., Alençon, 1960, **46**: 37-163, bibl. 88, illus.

Decreases in soluble amino compounds, nitrates and total N in the presence of 2,4-D were recorded. The effects on protein synthesis were dependent on various factors, but in general the proportion of protein in the total N tended to increase.

5697. GROVE, J. F.
The gibberellins.
Quart. Rev. chem. Soc., Lond., 1961, **15**: 56-70, bibl. 79.

The aspects covered in this review are: the occurrence of gibberellins in higher plants; their significance in plant physiology; their nomenclature, structural relationships, chemistry and biogenesis; and the gibberellins in diterpene chemistry.—I.C.I. Ltd., Welwyn, Herts.

5698. Gukova, M. M., and Faustov, V. V.
The stimulating action of gibberellin. [Russian, with English summary 6 lines.]
Izv. Timirjazev. sel'sk. Akad., 1961, No. 2, pp. 114-28, bibl. 48.

Results are given of experiments on the effect of GA on the growth of some vegetables, the flowering of ornamentals and the enzyme activity in seeds, and on the interaction between GA and IAA.

5699. Simpson, G. M., and Wain, R. L.
A relationship between gibberellic acid and light in the control of internode extension of dwarf peas (*Pisum sativum*).
J. exp. Bot., 1961, **12**: 207-16, bibl. 14.

Experimental evidence indicated that GA had an insignificant effect on the internode growth-rate in dwarf peas germinated and grown in darkness. When exposed to either red or white light and treated with GA, dwarf pea seedlings showed a marked internode extension. Various combinations of light and dark together with GA indicated the possibility of the formation of a light-promoted growth inhibitor which can be reversed in its action by GA. It is suggested that the site for interaction of the postulated inhibitor and exogenous GA is immediately adjacent to the shoot meristem. [Authors' summary.]—Wye Coll., Univ. London.

5700. Šebánek, J.
Příspěvek k řešení otázky praktického využití giberelinu v našem zemědělství se zřetelem na vodní provoz v rostlině. (**A contribution to the practical use of gibberellin in Czechoslovakian agriculture with respect to the water regime of the plant.**) [English and Russian summaries ½ p. each.]
Sborn. vys. Šk. zeměd. v Brně, Rada A, 1960, No. 3-4, pp. 277-92, bibl. 16, illus.

In preliminary experiments with vines 4 sprays of GA at 50 mg./1., applied during and immediately after flowering, increased the weight of the berries by 12% but slightly reduced their sugar content. Seed treatment with GA reduced the final fresh weight of the aerial parts of pea plants; the initial internode elongation was so rapid that it led to a final growth depression. Tomatoes treated in the seedling stage with GA set more fruit, but the excessive stimulation of the plants resulted in retarded development and delayed ripening. Results with peppers were similar to those obtained with tomatoes. On the basis of these experiments, the treatment of seeds or seedlings with GA is not recommended, as it leads to premature and too vigorous growth of the axis at the expense of the leaves. In general, treatment with GA should be accompanied not only by adequate nutrition but also by an ample water supply, since the treated plants lose water more rapidly and are less resistant to drought. [For similar work on IAA and TIBA, see *H.A.*, 30: 3928.]

5701. Goffeau, A., and Buffel, K.
Effects of gibberellins and dinitrophenol on respiration of stem tips of a long and a short pea variety. [French?]
Agricultura, Louvain, 1960, **8**: 299-318, bibl. 24, from abstr. in *J. Sci. Food Agric.*, 1961, **12**: i-269-70.

GA added to the nutrient solution at 3 p.p.m. increased the stem length after 9 days by about 80% in the long, and 100% in the short variety. Respiration of the 1 cm. stem tips was not affected in the long, but was decreased by about 29% in the short variety; the overall respiration rate of the stems was increased. At 5×10^{-5} M, DNP increased the respiration rate in the stem tips of the long, but not of the short variety.

5702. Asen, S., Cathey, H. M., and Stuart, N. W.
Enhancement of gibberellin growth-promoting activity by hydrangenol isolated from leaves of *Hydrangea macrophylla*.
Plant Physiol., 1960, **35**: 816-19, bibl. 18.

A fuller account of work reported in *H.A.*, 31: 1790.

5703. Povolockaja, K. L.
On the mechanism of the action of maleic hydrazide in plants. [Russian, with English summary ¼ p.]
Izv. Akad. Nauk SSSR, Ser. biol., 1961, No. 2, pp. 250-5, bibl. 6, illus.

Experiments with young tomato plants showed that uracil and riboflavin both removed the inhibiting effects on growth caused by MH. It is suggested that MH is an antimetabolite of uracil and that riboflavin catalizes oxidation of MH. MH treatment also inhibits synthesis of nucleic acids. [See also *H.A.*, 31: 93.]

5704. Scott, F. M., Bystrom, B. G., and Sjaholm, V.
Anatomy of traumatic acid-treated internodes of *Ricinus communis*.
Bot. Gaz., 1961, **122**: 311-14, bibl. 17, illus.

Injection of the wound hormone, traumatic acid, into the hollow pith of the internodes of castor bean induced intensive mitosis in the inner pith within 3 days; this extended centrifugally into the middle and outer pith. Abundant papillae were present on the surface of the inner pith. These effects were contrasted with the effects of wounding alone, without injection of traumatic acid. It is concluded that the hollow pith of *Ricinus communis* is very suitable tissue for the study of the anatomical and cytological effects of traumatic acid.—Univ. Calif., Los Angeles.

Pollen.

(*See also* 6303, 6441, 7017.)

5705. King, J. R.
The freeze-drying of pollens.
Econ. Bot., 1961, **15**: 91-8, bibl. 16, illus.

Pollens of a number of species and varieties, including several fruit tree species, tomatoes, onions and sugar cane, were subjected to freeze-drying at a temperature of −60° C. in a vacuum of 50–250 mm. of mercury. After a certain time the vacuum was released and the pollen stored in N gas in a sealed bottle or tear bulb at room or low temperatures. To recover germinability, the pollen was kept at 5° C. and 60% R.H. The data showed that pollen retained a high percentage of viability for a long period following freeze-drying and storage in an inert gas, even in an uncontrolled environment, but that low temperature storage was beneficial. [See also *H.A.*, 30: 1500.]—La St. Univ., Baton Rouge.

Storage and marketing.

(*See also* 6258.)

5706. Trout, S. A., and Stevenson, C. D.
Cool storage of fruit and vegetables.
Pamphl. Div. Pl. Ind., Qd Dep. Agric. **175**, [undated], pp. 58, illus.

Methods, equipment, factors affecting storage life, and physiological disorders.

5707. Salunkhe, D. K.
Gamma radiation effects on fruits and vegetables.
Econ. Bot., 1961, **15**: 28-56, bibl. 109, illus.

Firm crops such as cherries, pears, grapes and cabbages were more suitable than soft crops for preservation by gamma radiation, and some varieties were more suitable than others. A state of firm-ripeness was necessary for successful radiation. An irradiation dosage of 2–3 × 10^5 rads extended the storage life of fruit and vegetables from 2 to 6 weeks, and 10–20 × 10^3 rads inhibited sprout formation in bulb, tuber and root crops. High doses resulted in softening, increased respiration and a degradation of complex components, but softening was an advantage with older crops of asparagus and peas. Antibiotics or anti-fungal chemicals may be used in conjunction with radiation. Cherries irradiated in polythene bags were unacceptable after 1 month at 40° F., but those treated in Mylar C bags were in excellent condition for up to 2 months after treatment. [See also *H.A.*, 30: 3223 and 3224.]—Utah St. agric, Exp. Stat., Logan.

5708. Dupaigne, P., and Lossois, P.
La normalisation internationale des fruits. **(International standardization of fruits.)**
Fruits d'Outre Mer, 1961, **16**: 12-14.

The aims and activities of the International Standardization Organization (I.S.O.) are described, and a brief report is given of the meeting in Budapest of the sub-committee for fruits and vegetables, with reference to terminology, sampling, and the examination of fruits, vegetables and derived products.

5709. Organization for European Economic Co-operation.
Marketing of fruit and vegetables in Spain and Turkey.
Publ. EPA/OEEC **29**, 1960, pp. 84, maps.

Areas, seasons, production and trade.

Herbicides and weed control.

(*See also* 6048, 6246, 6247.)

5710. Voderberg, K.
Abhängigkeit der Herbizid-Wirkung auf Bodenmikroorganismen vom Nährsubstrat. **(The dependence of herbicide action on soil micro-organisms in a nutrient medium.)** [Russian and English summaries ¼ p. each.]
NachrBl. dtsch. PflSchDienst, Berlin, 1961, **15**: 21-3, bibl. 2.

The influence of 8 herbicide products on bacteria and streptomycetes isolated from different soils was found to be very weak, even at concentrations far above those found in the soil after normal commercial applications. Only propham at 200 p.p.m. proved to be inhibitive. High herbicide concentrations, however, strongly inhibited fungal growth, but the inhibiting effect fell off with decreasing concentration and with time. The effect of herbicides on fungi was found to depend strongly on the nutrient medium, but no correlation could be established between herbicidal effect and the potential of the nutrient medium for fungal or bacterial growth.—Inst. Bot., Humboldt-Univ., Berlin.

5711. Stryckers, J.
Totale vernietiging van vegetatie. **(Complete destruction of vegetation.)** [French, German and English summaries ¼ p. each.]
Reprint from *Meded. LandbHogesch. Gent*, 1959, **24**: 864-80, bibl. 9.

Effects, which were studied after the application of many herbicides at several rates, were the degree of destruction of vegetation, the rate of action and persistence of the herbicides and changes in the flora after regeneration. Spring applications gave the best results, but autumn applications were also effective if the plants were first cut down.

5712. Mississippi State Weed Committee.
1961 weed control recommendations for Mississippi crops.
Miss. Fm Res., 1961, **24**(2): 1-8, illus.

Including control on lawns and in vegetable crops, and control of specific weeds.

5713. TREVETT, M. F., AND MURPHY, H. J.
A guide for the use of chemical weed killers in 1961.
Misc. Publ. Me agric. Exp. Stat. **645**, 1961, pp. 35, illus.

In addition to recommendations, as previously [see *H.A.*, 30: 5233], for weed control in top and small fruits, vegetables, bulbs and lawns, the trial use of Zytron for crabgrass control in lawns is suggested.

5714. PLANT PROTECTION LTD.
Diquat, a new herbicide and desiccant.
Symp. Plant Protection Ltd., Fernhurst, May 1960, 1960, pp. 34, bibls.

The discovery, chemistry, mode of action and uses of 1,1¹-ethylene-2,2¹-dipyridylium dibromide are discussed in 6 papers [see also *H.A.*, 29: 2371].

5715. CRONSHEY, J. F. H.
A review of experimental work with diquat and related compounds.
Weed Res., 1961, **1**: 68-77, bibl. 33.

The properties and mode of action of these herbicides are reviewed, together with the results of field trials. Possible uses include clearing seedbeds before sowing, weeding round trees and bushes and, by directed spraying, suppressing weeds in the inter-rows of row crops.—Jealott's Res. Stat., Bracknell, Berks.

5716. MAKOVCOVÁ, O., AND VACULÍK, P.
Untersuchungen über die Wirkung einiger 1,2,4-Triazolderivate auf das Wachstum der Keimlinge von *Sinapis alba* L. (**On the effects of several 1,2,4-triazole derivatives on the growth of seedlings of white mustard.**) [Czech and Russian summaries 13 lines each.]
Biol. Plant., Prague, 1961, **3**: 89-98, bibl. 13.

None of the 12 substituted derivatives of triazole listed had an effective inhibiting action. Two of the substances had a growth-promoting effect on the roots and hypocotyls.

5717. MCARDLE, F. J., AND OTHERS.
Influence of herbicides on flavor of processed fruit and vegetables.
J. agric. Food Chem., 1961, **9**: 228-30, bibl. 5.

Using the manufacturers' suggested rates 28 herbicides were applied to several vegetables and to strawberries. Flavour evaluation of the processed products showed that the flavour was reduced by ACP 103, Benzac 103A, Chlorazine, diuron, Emid, FW 450, neburon, Niagara 5521, Randox, simazine and 2,4-D amine.—Pa agric, Exp. Stat., University Park, and Md agric. Exp. Stat., College Park

5718. PIECZARKA, S. J., AND WARREN, G. F.
Confining fumigants in the soil with surface seals.
Weeds, 1961, **9**: 106-10, bibl. 9.

In seedbed trials in cold frames plots 3 × 6 ft. were treated with SMDC, allyl alcohol and emulsifiable 1,3-dichloropropene at 400 and 800 lb./acre, applied in 2 gal. of water per plot; the plots were then sealed with either 15 gal. of water or a 4-mil polythene film. At the 400 lb./acre rate of fumigant with a polythene seal there were fewer weeds than at the 800 lb./acre rate with a water seal. All fumigants gave a good weed control when a polythene seal was used, with the exception of allyl alcohol which failed to control grasses. In further trials certain plastic-like materials were sprayed on the surface of soil fumigated with 1,3-dichloropropene. Latex VL-600 approached polythene film in effectiveness as a seal; other promising materials were Plyac and Vinsol emulsion.—Purdue Univ., Lafayette, Ind.—From *Weed Abstr.* **10**, No. 594.

5719. PIECZARKA, S. J., AND WARREN, G. F.
Effect of soil seals on the diffusion and drench patterns of fumigants.
Soil Sci., 1961, **91**: 265-71, bibl. 21, illus.

The experiments were conducted with a view to their application in weed control by soil fumigation. A plastic film seal was markedly superior to a water seal or to soil compaction in extending the diffusion of either SMDC (sodium N-methyl dithiocarbamate dihydrate) or 1,3-dichloropropene, injected into the centre of a cubic foot of muck soil at the equivalent of 700 lb./acre. At double this application rate dichloropropene under the plastic seal gave almost 100% kill of the experimental tomato seeds used. In sandy soil either fumigant at 350 lb./acre completely killed the seeds in the 1 cu. ft. container with the plastic seal. In muck soil a water seal reduced the surface effectiveness of SMDC, but in sandy soil its action approached that of a plastic seal. In muck soil neither compaction nor a water seal was significantly better than no seal for dichloropropene. Injections of allyl alcohol or chloropicrin showed poor diffusion in both soils under any seal, and allyl alcohol diffused more rapidly upward than in other directions. In muck soil the maximal diffusion of SMDC required over 120 hours and that of dichloropropene 72 hours, whereas in sandy soil they each required 48–72 hours. In muck soil drenching with allyl alcohol killed the seeds only in the top few inches, and SMDC gave even shallower control, while dichloropropene was unsatisfactory. In sandy soil, however, all 3 fumigants were very effective, particularly near the surface with a plastic seal, whereas a water seal gave erratic results in the surface layer.—Purdue Univ., Layfayette, Ind.

5720. DARBY, J. F., RHOADES, H. L., AND SCUDDER, W. T.
Preliminary report on aqueous solutions or emulsions of plastic resins and related materials as sealants for soil fumigants.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 138-43, illus.

Aqueous solutions or dispersions of polyvinyl alcohol, polyvinyl acetate, polythene and related materials were sprayed over the soil surface to prevent the escape of vapours of DMTT (Mylone) and SMDC (Vapam, VPM). At soil temperatures below 75° F. the liquid plastic resins did not enhance the effectiveness of the fumigants. At temperatures above 75° F. ½ rates of the fumigants when sealed in were as effective as the recommended rates not sealed in. The following sealing materials were used with some success on celery or cabbage seedbeds: Bankit, diluted in 3 parts of water (1:3); Dow Latex 521R (1:3); Gelvatol 1–90, 2%; Gelvatol 1–60, 4%; Gelva TS–70 (1:3 to 1:5); Neocryl S21B (1:4); Plyac (1:3); and Rhoflex AC–33 (1:2). [From authors' summary.]—Centr. Fla. Exp. Stat., Sanford.

5721. Becker, C. F., and others.
Equipment for metering, distributing and mixing granular herbicides into bands.
Trans. Amer. Soc. agric. Engrs, 1960, 3(2): 108-10, illus.

Descriptions and data on the performance of machines developed at the University of Wyoming. [See also *H.A.*, 29: 2416b.]—See *Weed Abstr.*, **10**, No. 951.

5722. Wooten, O. B., and McWhorter, C. G.
A device for subsurface application of herbicides.
Weeds, 1961, **9**: 36-41, bibl. 5, illus.

The tractor-mounted applicator is described in detail [see also *H.A.*, 30: 5238]. Through the use of this device it was possible to place a ¼-in. thick 16-in. wide band of spray material from 2 to 6 in. under the soil surface. Much better weed control was obtained with sub-surface application of the test herbicide (EPTC) than with surface application of an identical rate. [From authors' summary.]—U.S.D.A. and Miss. agric. Exp. Stat., Stoneville.

Plant protection.

(*See also* 6217, 6230, 6314, 6478, 6479, 7088, 7259.)

5723. Busbey, R. L.
Pesticide names found in U.S.S.R. technical literature.
J. econ. Ent., 1961, **54**: 254-7.

A very useful list of agricultural chemicals giving the transliterated names and original forms in Cyrillic and their English equivalents or definitions.

5724. Murphy, E. F., and others.
Effect of insecticides and fungicides on the flavor quality of fruits and vegetables.
J. agric. Food Chem., 1961, **9**: 214-23, bibl. 3.

In work at 8 institutions over a period of 6 years 528 evaluations were made on 36 single insecticides, 152 on 18 insecticide combinations, 66 on 11 single fungicides and 118 on 11 fungicide combinations. The results are presented mainly as tables. Insecticide evaluations were made on 23 crops (20 vegetables and 3 fruits), and fungicide evaluations on 6 crops (5 vegetables and 1 fruit). The insecticides BHC, lindane, toxaphene, endrin and malathion, and the fungicide PCNB were associated with a notable degree of poor flavour quality. Six combinations of pesticides had an adverse effect on flavour; in some cases this appeared to be related to specific components of the mixtures, but in others it appeared to be due to interaction of the components.—Univ. Maine, Orono, and elsewhere.

5725. Weintraub, M., Kemp, W. G., and Ragetli, H. W. J.
Some observations on hypersensitivity to plant viruses.
Phytopathology, 1961, **51**: 290-3, bibl. 14, illus.

Grafts made between healthy clones of *Dianthus barbatus*, normally hypersensitive [resistant] to carnation mosaic virus, and other clones systemically infected with CMV resulted in the complete systemic invasion of the hypersensitive clones by the virus. Similar results were obtained in grafts involving healthy hypersensitive plants of *Nicotiana glutinosa* and *N. tabacum* Connecticut Havana 423, with *N. tabacum* var. Haronava systemically infected with tobacco mosaic virus. [From authors' summary.]—Canada Dep. Agric., Vancouver and Ontario.

5726. Kleczkowski, A.
Effects of ultraviolet radiation on plant viruses and on the capacity of host plants to support their multiplication.
A.R. Rothamsted exp. Stat. 1960, 1961, pp. 234-45, bibl. 42.

A review, covering action spectra of viruses, the kinetics of inactivation, photoreactivation, loss of infectivity without appreciable structural change in the virus, and the effects of ultraviolet irradiation of leaves (especially of bean and tobacco) before and after infection.

5727. Braun, R., and Kradolfer, F.
Zur Chemotherapie pflanzlicher Virosen. **(The chemotherapy of plant viruses.)** [English summary ¼ page.]
Phytopath. Z., 1961, **41**: 257-64, bibl. 13.

Using the local lesion technique the following substances were found to be active against TMV and *Solanum* virus X: haematoporphyrin, hydrazine sulphate, benzoquinone, a diazoalkanyl ester and bis-pyrimidine-diphenyl-aminosulphone. A triterpene-like substance was found to absorb TMV quantitatively from aqueous solution. [From authors' summary.]—Inst. spez. Bot., eidg. tech. Hochsch., Zürich.

5728. Hein, A.

Untersuchungen mit einem Virushemmstoff aus Hefeextrakt. **(Experiments with a virus-inhibiting substance from yeast extract.)** [English summary ⅓ page.]

Phytopath. Z., 1961, **41**: 236-56, bibl. 37.

The inhibitor is heat stable, can be precipitated by acetone and ethanol, and is partially soluble in chloroform. It may contain several active components, but its uptake by plants could not be demonstrated. TMV, tobacco rattle, tobacco ringspot and other viruses were inhibited, the degree of inhibition being dependent on the host plant. [From author's summary.]—Dtsch. Akad. LandwirtsWiss., Aschersleben, Berlin.

5729. Semal, J.

Action de l'extrait de *Begonia tuberhybrida* sur le nombre de lésions locales formées par le virus de la mozaïque du tabac et par quelques autres virus. **(The action of *Begonia tuberhybrida* extract on the number of local lesions formed by tobacco mosaic virus and certain other viruses.)** [English summary ¼ p.]

Bull. Inst. agron. Gembloux, 1960, **28**: 433-44, bibl. 15.

When begonia juice was mixed with TMV and inoculated into leaves of beans and tobacco the number of local lesions decreased or increased according to the acid concentration of the juice. The virus inhibitor was identified indirectly as oxalic acid. It is suggested that the inhibition of the virus was caused by acidity and the stimulation by oxalic ions. [See also next abstract.]

5730. Semal, J.

Action des acides sur le nombre de lésions locales formées par le virus de la mosaïque du tabac. **(The effect of acids on the number of local lesions formed by tobacco mosaic virus.)** [English summary 6 lines.]

Parasitica, 1961, **17**: 29-37, bibl. 16.

The acids mixed with tobacco mosaic virus inoculum and applied to the leaves of beans and *Nicotiana glutinosa* were hydrochloric, nitric, sulphuric, boric, formic, acetic, oxalic and citric. A virus-inhibiting action was observed, which was definitely not dependent on the pH, but (except for citric and boric acids) on the normality of the acid, and was more marked in beans than in *N. glutinosa.* Low concentrations of oxalic acid, however, increased the number of lesions in both plants. —Inst. agron., Gembloux.

5731. Goodman, R. N., and Goldberg, H. S.

The influence of cation competition, time, and temperature on the uptake of streptomycin by foliage.

Phytopathology, 1960, **50**: 851-4, bibl. 22.

Leaves of apple, *Coleus* and other plants, homogenized in aqueous solutions containing streptomycin and the metallic cations K^+, Na^+, Mn^{++}, Ca^{++}, Al^{+++}, and others, clearly demonstrated a competition between the metallic cations and the organic cation streptomycin for adsorption sites in homogenized leaf tissue. Excised apple, bean and *Coleus* leaves absorbed streptomycin in significant quantities from a water agar containing the drug. The quantity absorbed was influenced by length of exposure (time), specific surface exposed to the agar (upper or lower), and temperature. Generally, the longer the exposure period, the more streptomycin was absorbed. Bean and *Coleus* foliage both absorbed more streptomycin through the lower surface, whereas apple leaves absorbed more through the upper surface, which is devoid of stomatal openings. Temperature coefficients ($Q_{10's}$) of 2·0 and 2·4 for bean and apple leaves, respectively, were obtained for streptomycin absorption by lower leaf surfaces over a relatively wide temperature range. These Q_{10} values suggest that foliar absorption may be metabolically controlled, at least in part. [From authors' summary.] —Univ. Mo., Columbia.

5732. Norman, A. G.

Action of hexachlorophene on plant roots.

Antibiotics and Chemotherapy, 1960, **10**: 675-81, bibl. 11, from abstr. in *J. Sci. Food Agric.*, 1961, **12**: i-270.

Root growth of young cucumber seedlings was depressed by exposure to concentrations of hexachlorophene as low as 2·7 μg./ml. Higher concentrations inhibited growth.

5733. Ark, P. A., Bottini, A. T., and Thompson, J. P.

Sodium usnate as an antibiotic for plant diseases.

Plant Dis. Reptr, 1960, **44**: 200-3, bibl. 18.

Sodium usnate, an antibiotic from lichens, is effective against the tomato canker organism, *Corynebacterium michiganense*, but not against gram-negative phytopathogenic bacteria. Both spray and dust formulations gave effective experimental control of downy mildew of cucumber (*Pseudoperonospora cubensis*), bean rust (*Uromyces phaseoli*), bean anthracnose (*Colletotrichum lindemuthianum*) and bean powdery mildew (*Erysiphe polygoni*), and brown rot (*Monilia fructicola*) on apricots. Excessive humidity (80% R.H. or higher) in the presence of the antibiotic causes injury, which can be prevented by the incorporation of 1% chlorophyllin into the spray.—Univ. Calif., Berkeley.

5734. Oort, A. J. P., and Dekker, J.

Experiments with rimocidin and pimaricin, two fungicidal antibiotics with systemic action.

Reprint from *Proc. IVth int. Congr. Crop Prot., Hamburg, 1957*, 1960, Vol. **2**, pp. 1565-7.

Both antibiotics showed a systemic fungicidal effect when pea seeds, infected with *Ascochyta pisi*, were soaked for 24 hours in 75 p.p.m. of the pure substance at 20° C. Higher concentrations were phytotoxic. There was no fungicidal effect against inoculations made after uptake of the antibiotics for 24 hours. In practical seed-disinfection tests the antibiotics reduced infection to almost nil with *Ascochyta pisi* and *Mycosphaerella pinodes* in peas, *Colletotrichum lindemuthianum* in beans, *Phoma betae* in beet, *Stemphylium radicinum* in carrots and *Alternaria* species in radishes.—Lab. Phytopath, Wageningen.

5735. PERRIN, D. R., AND BOTTOMLEY, W.
Pisatin: an antifungal substance from *Pisum sativum* L.
Nature, 1961, **191**: 76-7, bibl. 9.

Details of the chemical structure and behaviour of a substance isolated from pea pods inoculated with fungal spores, and which is believed to provide the resistance to fungi non-pathogenic to the pea. [See also *H.A.*, 31: 126.]—C.S.I.R.O., Canberra.

5736. AYCOCK, R., AND OTHERS.
Symposium on *Sclerotium rolfsii*.
Phytopathology, 1961, **51**: 107-28, bibls.

A series of papers dealing with the history, host range, distribution, ecology, physiology and control of *Sclerotium rolfsii*.

5737. PEACOCK, F. C.
Practical problems and recent trends in nematode control.
Ann. appl. Biol., 1961, **49**: 381-3.

An outline of recent aspects of chemical control, covering the various groups of nematicides available, the mechanism of natural resistance shown by plants and the possibility of chemically-induced resistance in plants resulting from foliar-applied chemicals.

5738. FEDER, W. A.
Osmotic destruction of plant parasitic and saprophytic nematodes by the addition of sugars to soil.
Plant Dis. Reptr, 1960, **44**: 883-5, bibl. 2.
FEDER, W. A., HUTCHINS, P. C., AND EICHHORN, J. L.
Reduction of soil-borne nematode populations by selected carbohydrates.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 39-42, bibl. 2, illus.

The addition of sucrose or dextrose to soil samples, at the rate of 5% by weight, gave up to 100% kill of various nematodes after 24 hours. The extent of kill increased as the soil dried, probably owing to the increasing osmotic value of the soil solution. In a small scale field experiment dextrose at 1% by weight was rototilled into a sandy soil infested by root-knot nematodes; 24 hours later the plot was planted with okra. The average weight of plants harvested after 2 months was 11 g., whereas the control plants averaged 6g. Roots of both treated and control plants showed evidence of galling, which, however, was much more severe on the roots of the control plants. The growth of citrus seedlings seemed to be retarded in sugar-treated soils, but when the sugars were flushed out with water normal growth was resumed.—Agric. Res. Serv., U.S.D.A., Orlando, Fla.

5739. SASSE, K.
A new group of non-phosphorus acaricides.
UNTERSTENHÖFER, G.
On a new group of acaricides.
Höfchen-Briefe, 1960, **13**: 197-207, bibl. 1, and 207-11, bibl. 4.

Quinoxaline trithiocarbonate (Ss 1451 or Eradex) is a non-toxic specific acaricide, also effective against mildew fungi. Other quinoxaline derivatives are promising, and it is suggested that they are suitable for spider mite control in regions where mites have developed resistance.

5740. SMIT, F. M.
Acricid, een nieuw acaricide met fungicide eigenschappen. **(Acricid, a new acaricide with fungicidal properties.)**
Summary in *Tijdschr. PlZiekt.*, 1961, **67**: 64.

This new German material, containing dinitrobutylphenyl-dimethylacrylate, is not only an effective acaricide (active against "phosphorus-resistant" mites) but has controlled various mildews (including *Podosphaera leucotricha* and *Oidium tuckeri*). Acricid was non-phytotoxic to many crops in the field; under glass carnations were not affected, but the rose Mme Ofman was sensitive to the material.

5741. HENNEBERRY, T. J.
The effect of plant nutrition on the reproductive rate and susceptibility to malathion of two strains of the two-spotted spider mite, *Tetranychus telarius* (L.).
Diss. Abstr., 1961, **21**: 2840, being *L.C. Card No. Mic.* 61-886 of 85 pp.

The reproductive rate of malathion-resistant and malathion-susceptible strains of the mite was related to the N nutrition and carbohydrate level of the host plant (beans). With increases in N supply and absorption parallel to increases in carbohydrate levels there were corresponding increases in numbers of mite progeny. At the highest levels of N supply leaf contents of carbohydrates decreased and the reproductive rate was depressed or stationary. Mites which were not resistant to malathion were more affected by a deficiency of N in the host plants than were resistant mites, and were unable to survive on such plants. An increase in the supply of P was accompanied by an increase in the reproductive rate of the susceptible mites, and an increase in K had a similar effect on the reproductive rate of resistant mites. Increasing the N supply to the host plants resulted in reduced resistance of mites to malathion. The susceptible mites showed more response to variation in the P supply to the host, and there was a decrease in susceptibility to malathion following an increase in P supply.—Univ. Md.

5742. Dennis, E. B., and Edwards, C. A.
Phytotoxicity of insecticides and acaricides. I. Foliage sprays.
Plant Path., 1961, **10**: 54-60, bibl. 6, illus.

Commonly-used pesticides were sprayed on the foliage of a range of outdoor and indoor crops for which they would normally be recommended, using once, twice and five times normal dosage rates, with or without a wetter. Records were kept of the development, description and location of phytotoxicity symptoms, and these symptoms are described for each pesticide. [From authors' summary.]—N.A.A.S., Bristol.

5743. Beye, F.
Die Wirkungen von Insektiziden auf das Wachstum von Kressewurzeln. (**The effect of insecticides on the growth of cress roots.**)
[English summary ½ p.]
Z. PflKrankh., 1961, **68**: 6-17, bibl. 23.

The effects of 0·1–0·001% solutions of chlorobenzilate, DDT, phenkapton, Metasystox, parathion and diazinon on the germination and root growth of cress (*Lepidium sativum*) seedlings were investigated. The following tests were made: (1) a germination test; (2) measurement of growth after 3, 6 and 9 hours in 0·1 and 0·05% solutions; (3) measurement of growth after 17 hours using 0·1–0·001% solutions; and (4) the reaction test, in which after 4 hours growth in the solution, the seedlings were washed, and measured after a further 13 hours' growth in distilled water. All except DDT depressed germination. Initial growth during the first 16–20 hours was strongly inhibited by chlorobenzilate, diazinon and parathion; thereafter in the period up to 48 hours the inhibiting action became weaker. [See also *H.A.*, 31: 1830.]—Bot. Inst., Univ. Freiburg i, Br.

5744. Martignoni, M. E., and Milstead, J. E.
Quaternary ammonium compounds for the surface sterilization of insects.
J. Insect Path., 1960, **2**: 124-33, from abstr. in *Z. PflKrankh.*, 1961, **68**: 313.

A 0·2% solution of Hyamine 10–X reduced lepidopterous larvae in the surface soil by an average of 64·1%. Pupal populations were reduced by 70–100%.

5745. Reed, J. P., and others.
Soil fumigation.
Ext. Bull. Rutgers Univ., N.J., **353**, 1961, pp. 8, illus.

Available chemicals, application rates, times and methods, machinery, granular fumigants, and precautions.

5746. De Martin, S.
Le macchine per i trattamenti antiparassitari. (**Machines for plant-protection treatments.**)
[French summary ¼ p.]
Frutticoltura, 1961, **23**: 193-214, bibl. 4, illus.

Economics, spray techniques, materials and droplet and dust-particle sizes are discussed, and many types of spraying and dusting machines, including those installed in aircraft, are described.—Ist. Mecc. agrar., Univ. Bologna.

5747. Jenny, J.
Méthodes modernes de lutte contre les ennemis des cultures. (**Modern methods of crop protection.**)
Reprint from *Tracteur Mach. agric.* 1960, No. 8/9, being *Publ. Stats féd. Ess. agric., Lausanne* **623**, 1960, pp. 16, bibl. 5, illus.

Machines for spray and mist application of fungicides and insecticides are described, with additional brief information on protection of vegetable crops, fruit trees and vines.

5748. Snegovskii, I. F.
Modern methods in the mechanization of plant protection by chemicals. [Russian.]
Zemledelie, Mosk., 1961, **23**(4): 50-6, illus.

Machines for spraying, dusting, seed treatment, soil fumigation, distribution of baits, etc.

5749. Yeomans, A. H., Fulton, R. A., and Sullivan, W. N.
An insecticide vaporizer for treating small enclosed areas.
J. econ. Ent., 1961, **54**: 399, bibl. 1, illus.

A cotton wick in a test tube containing a solution of DDVP was placed through a hole in the bag of a small battery-operated vacuum cleaner which blew air over the exposed end of the wick.—U.S.D.A., Beltsville, Md.

Chemical residues and their analysis.

(*See also* 6231, 6232, 7269.)

5750. Leinbach, L. R., and Brekke, J. E.
A modified Gibbs method for the determination of 1 p.p.m. or less of *o*-phenylphenol in fruits.
J. agric. Food Chem., 1961, **9**: 205-6, bibl. 10, illus.

5751. McKinley, W. P., and Magarvey, S. A.
A quantitative method for the determination of 2,3-dichloro-1,4-naphthoquinon (Phygon) residues in cherry extracts.
J. Ass. off. agric. Chem., 1960, **43**: 825-8, bibl. 8.

Using a triethylamine reagent in place of dimethylamine.

5752. Laws, E. Q., and Webley, D. J.
The determination of organo-phosphorus insecticides in vegetables: a general method for insecticide residues.
Analyst, 1961, **86**: 249-55, bibl. 3.

A method is described for the extraction of insecticides from treated cabbages and other vegetables and for their separation into water-soluble and petroleum-soluble groups. The further separation of members of each group from associated plant material is described for 18 organo-phosphorus insecticides, and the quantitative separation of both groups is discussed, with particular reference to mixtures of (a) phorate with its oxygen-analogue sulphone and (b) parathion-methyl with Phosdrin. [Authors' abstract.]—D.S.I.R., London.

5753. Tietz, H., and Frehse, H.
Method of determining residues of systemic insecticides of the Metasystox group in plants.
Höfchen-Briefe, 1960, **13**: 212-21, bibl. 20.

The harvested crop to be analysed is subject to a preliminary purification by extraction with organic solvents, the extracts are purified on a carbon column, wet-ashed and analysed for their content of phosphorus in micro quantities. An additional purification stage may be necessary for certain crops such as hops. Residues can be determined to values of below 0·5 p.p.m.

Experimental techniques.

(*See also* 5644, 5705, 5867, 6267, 6293, 6503, 6530, 6538, 6613, 6950, 6954.)

5754. Slepjan, E̊. I., and Kiškovskij, A. N.
On the use of radiography for the study of flower structure. [Russian.]
The possibilities of using X-rays for the study of fruits. [Russian.]
Bot. Žurnal, 1960, **45**: 1009-10, bibl. 9, illus., and 1309-10, bibl. 2, illus.

Description of methods, with illustrated examples.

5755. Markov, M. V.
A field method of determining root pressure by measuring the quantity of sap exuded per unit of time. [Russian.]
Bot. Žurnal, 1960, **45**: 1502-3.

Exudation rates compared from well and poorly developed beans.

5756. Benedict, H. M., and Swidler, R.
Nondestructive method for estimating chlorophyll content of leaves.
Science, 1961, **133**: 2015-16, bibl. 3.

A quantitative relationship is shown to exist between the chlorophyll content of soya bean and Valencia orange leaves and their percentage reflectance of light of wavelength 625 mμ as measured by a colorimeter with reflectance attachment. [Authors' abstract.] In studies on the response of plants to iron supply this method has made it possible to make successive estimates of chlorophyll content on the same leaf.—Stanford Res. Inst., Southern Calif. Labs, South Pasadena.

5757. Šul'gin, V. M.
Determination of light and shade in tree stands. [Russian.]
Vestn. sel'sk. Nauki, 1961, **6**(5) : 111-16, bibl. 10, illus.

A model system of calculating the density of shade in tree canopies at different positions of the sun, and methods for determining the photosynthetic activity of the crowns, are described.

5758. Müller, L. [E.]
Un aparato micro Kjeldahl simple para análisis rutinarious rápidos de materias vegetales. **(A simple micro-Kjeldahl apparatus for rapid routine analyses of [nitrogen in] plant material.)** [English summary 7 lines.]
Turrialba, 1961, **11**: 17-25, bibl. 10, illus.

5759. Emmert, F. H.
A comparative evaluation of the total and various fractional tests for diagnosing plant potassium and magnesium status.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 700-4, bibl. 4.

Total and 3 fractional test procedures were compared for determining K and Mg in leaves of McIntosh apple trees growing in a hydroponic unit and in commercial orchards. The results suggest that none of the fractional tests has any particular advantage over the others or over the total test as a diagnostic tool. The experimental error for the total test was below those for the 3 fractional tests.—Storrs agric. Exp. Stat., Univ. Conn.

5760. Marrese, R. J., Duell, R. W., and Sprague, M.A.
A comparison of three current methods for the analysis of phytin phosphorus.
Crop Sci., 1961, **1**: 80-1, bibl. 7.

Volumetric, gravimetric and ion-exchange methods, which could be used to determine the phytin content of seeds.

Practical and research equipment.

(*See also* 5722, 5746-5748, 5896, 5909, 5917, 6004, 6011, 6021, 6042, 6043, 6215, 6266, 6324, 6556, 6924, 6925, 7204.)

5761. Cooper, S. W.
Report on test of Wolseley "Merry Tiller".
Rep. nat. Inst. agric. Engng **272/EA**, 1961, pp. 10, illus.

This rotary cultivator was tested for inter-row work in pyrethrum, pineapples, sisal and coffee. With a few modifications the machine should prove suitable for inter-row crop work and small farming operations in East Africa.

5762. (James, P. E., and McConnell, J. F.)
New research tool will help scientists.
Agric. Res., Wash., 1960, **8**(12): 6, illus.

This is an aluminium dust-placement box equipped with baffles through which compressed air is blown. It can distribute dusts accurately and evenly on 6 × 8 ft. test plots. It could also provide a safe means of applying tracer isotopes,

5763. Prince, A. B., and Blood, P. T.
Construction of below ground growth chambers.
Stat. tech. Bull. N.H. agric. Exp. Stat. **99**, 1958, pp. 13, illus.

Details are given of the construction, including costs, and the operation of controlled environment chambers built in the basement of an unheated house. Each chamber measures 9 × 9 × 9 ft. and will operate in a temperature range of 17 to 37° C. and an R.H. range of 20 to 95% for 9 months of the year, but the chambers are not recommended where absolute temperature and humidity control is required.

5764. DeMaggio, A. E., and King, L. D.
Growth of medicinal plants in culture. I. A controlled cabinet for maintaining plant cultures.
J. pharm. Sci., 1961, **50**: 341-2, bibl. 5, illus.

The wooden cabinet, described and illustrated here, consists of 2 chambers, each of which can be controlled independently for temperature, humidity and illumination. One chamber can be used to keep stock cultures and the other to vary environmental factors.—Rutgers St. Univ., Newark, N.J.

5765. Lister, G. R., Krotkov, G., and Nelson, C. D.
A closed-circuit apparatus with an infrared CO_2 analyzer and a Geiger tube for continuous measurement of CO_2 exchange in photosynthesis and respiration.
Canad. J. Bot., 1961, **39**: 581-91, bibl. 29, illus.

A description of the apparatus, which permits continuous monitoring of the concentration of both the total and radioactive CO_2 around an experimental plant.

5766. Ford, H. W.
A hand instrument for estimating height and width of citrus trees.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 245-7, bibl. 2, illus.

Ease of construction, light weight and versatility are claimed for the implement described. Tree height and width were read within 15–25 seconds per tree with an error of 6–8 in. at a distance of 28 ft. for a total of 87 orange trees about 20 ft. high.—Citrus Exp. Stat., Lake Alfred, Fla.

5767. Coombe, D. E., and Evans, G. C.
Hemispherical photography in studies of plants.
Reprint from *Med. biol. Illus.*, 1960, **10**(2): 68-75, bibl. 3, illus.

An illustrated account is given of the properties and operation of a camera which photographs a complete hemisphere on a single exposure. Uses include the measurement of shade in a glasshouse at various times of the year, and light assessment in the siting of experimental plots.—Univ. Cambridge.

5768. Seiler, R., and Wolffgang, H.
Stanze für Blattproben. **(A punch for leaf samples.)**
Reprint from *Z. landw. UntersuchWes.*, 1961, Vol. 7, No. 1, p. 1, illus.

A simple hand punch is described which can punch out about 10 leaf samples in a minute. Basically it consists of a pair of steel pincer forceps operating the punch, with a plastic box attached to one arm to contain the samples.

5769. Grime, J. P.
Measurement of leaf colour.
Nature, 1961, **191**: 614-15, bibl. 1, illus.

A "comparator" is described which is made by mixing oil paints and which comprises 16 colours in 42 tints. It has been used in chlorosis studies.—Univ. Sheffield.

5770. Fogle, H. W., and Barnard, E.
Punched cards as aids in evaluating seedlings in the field.
Fruit Var. hort. Dig., 1961, **15**: 47-50, illus.

The use of 3 types of card is discussed, viz. edge-notched, mark-sensing and portable punched cards.

Greenhouses.

(*See also* 5958.)

5771. Grosse-Boes, J.
Der optimale Binderabstand bei einschiffigen Gewächshäusern. **(The optimal rafter spacing in single-span glasshouses.)** [English and French summaries ½ p. each.]
Gartenbauwiss., 1960, **25**: 349-77, illus.

Optimum rafter spacings were calculated for several sizes of vertical-walled glasshouse. Steel consumption per sq. m. of glasshouse area, in relation to glasshouse width, showed pronounced minima at certain rafter spacings. In general, the optimum rafter spacing increased with the width of the building. Total steel consumption rose with increasing width of the house and fell with decreasing roof angle. The total quantity of steel used can be reduced by choosing the correct rafter spacing and type of rafter, and by arranging a tie rod at a high level.—Inst. Tech. Gartenb., Hannover-Herrenhausen.

5772. ME̊NESKU, B.
The light regime in glasshouses and methods of improving it. [Russian, with English summary 4 lines.]
Izv. Timirjavez. sel'sk. Akad., 1960, No. 6, pp. 102-12, bibl. 16, illus.

Large model glasshouses were constructed of 3 designs with differently pitched roofs. The amount of light entering was measured in the centre of each model using a photoelectric cell. In January, February and March more light entered when the house was orientated east-west, whereas in April north-south orientation was better. These differences were much more marked on sunny days than on cloudy days. Models having roofs with unequal pitch (37° + 24° and 64° + 26°) admitted more light than the model with an equal pitch roof (26° + 26°), especially in the winter months.

5773. ROER, P., AND LOS, G. J.
Luchtbeweging in kassen. **(Air movement in glasshouses.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1961, **24**: 318-24, 330-1, bibl. 5, illus.

Measurements of air velocity in 4 glasshouses showed that the speed of air movement is closely related to the difference between outside and inside temperatures. Air velocities were highest along the ground and near the glass. Air speeds varied from 5 to 15 cm./sec., and speeds of 20 cm./sec. occurred occasionally. There was a tendency for speeds to be highest in the highest houses. In lower houses horizontal air speeds tended to be greater than the speeds of vertical air streams. There was no relationship between wind speed outside and air speeds in the glasshouse. [See also *H.A.*, 31: 3817.]—I.T.T., Wageningen.

5774. WATSON, W. W., AND RILEY, J. A.
Hood improves air circulation in greenhouse.
Miss. Fm Res., 1960, **23**(12): 1, 4-5, illus.

In an aluminium-framed greenhouse covered with a single sheet of 0·004-in. thick polythene, simply constructed air-intake hoods placed under the heaters induced air circulation and corrected undesirable temperature and humidity conditions, the air being drawn in from the coldest level in the house. At a height of 18 in. the temperature was 70° F. and the R.H. 81% with hoods, compared with 59° and 97% without hoods, and at a height of 96 in. the temperature was 93° and the R.H. 43% with hoods, compared with 106° and 27% without them.

5775. VOGEL, G., AND HEISSNER, A.
Vergleichende Untersuchungen zum Glas- und Plastfoliengewächshaus. **(Comparative studies with glass and plastic greenhouses.)** [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1961, **9**: 3-25, bibl. 21, illus.

There were no significant differences in yields of kohlrabi, lettuce and tomato grown in glass or polythene houses. Heat retention by the glasshouse was greater than that of the plastic house, and during January-March the plastic house required 12–13% more electricity for heating. There was no significant difference in transmission of visible light between the 2 types of greenhouse, but polythene transmitted more ultra-violet rays. There were no marked differences in relative humidity in the houses. Polythene and polyvinyl chloride sheets 0·1 mm. thick last for about 12–15 months. In view of the poor durability of plastic it is not recommended as a substitute for glass in frames or houses.—Inst. Gartenb., Grossbeeren.

5776. MATOUŠ, J.
Teplotní poměry v netopených sklenících krytých polyamidovou fólií ve srovnání se sklem. **(Temperature conditions in unheated greenhouses covered with polyamide film in comparison with glass.)** [English, Russian and German summaries ½ p. each.]
Věd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 237-47, bibl. 6.

During the period of the experiment, viz. 8 October–18 November, the total temperature sum in a portable house under a single layer of 0·1 mm. polyamide film was 278·40°, under a double layer 306·74° and under glass 301·98° C. Soil temperatures at a depth of 5 cm. were also highest under the double film. Films are considered an adequate glass-substitute for the protection of plants against early or late frosts.

5777. ULJEE, A. H.
Clear plastic ceiling helps control temperature in tomato glasshouses.
N.Z. comm. Gr, 1961, **16**(10): 25-6, illus.

Temperature measurements in a tomato house with a ceiling of plastic sheets stretched horizontally between the eaves showed the advantage of this type of insulation in heated and cold houses. Heat loss through the roof was reduced, peak day temperatures were lower, and improved ventilation was possible.—D.S.I.R., Auckland.

5778. (EMMERT, E. M.)
Mother Earth helps heat greenhouse.
Flor. Exch., 1961, **136**(19): 19, 67, illus.

Four trenches, 12 in. wide, 3 ft. deep and about 50 ft. long were dug outside a greenhouse and covered with plastic stretched tightly over hoops. Ground heat in these trenches plus that stored when the sun shines, flowed into the plastic greenhouse, raising temperatures about 5° F. above those in houses without such heating.—Univ. Ky.

5779. OPITZ, E.
Senk- und spreizbare Hängen. **(A hanging bench, which can be raised or lowered.)**
Gartenwelt, 1961, **61**: 151-2, illus.

A glasshouse bench which can be raised or lowered by means of pulleys.

TEMPERATE TREE FRUITS.

General.

(*See also* 5603, 7258, 7263, 7277.)

5780. Belohonov, I. V., and others.
[Abridged selected papers from a seminar on problems of establishing and conducting research on the culture of top and soft fruits during 1961-1965.] [Russian.]
Sborn. nauč.-tehn. Inf., Mičurinsk, 1960, **1**(9): 3-72.

The papers presented at this meeting deal with subjects ranging from pruning to weed control in orchards. Appended are recommendations for the conducting of research work on orchard practices in 1961-1965 and a method of soil analysis for nutrient content.

5781. French, B. O.
Some views on the problems of fruit growing.
J. Aust. Inst. agric. Sci., 1961, **27**: 3-10, bibl. 22.

A discussion on quality, yields, climate and soil, pest and disease control, spacing, rootstocks, varieties and tree physiology. Deciduous tree fruits, citrus, bananas and vines are considered.

5782. Wirth, A.
Betriebsorganisation aus obstbaulicher Sicht. **(Farm organization from the fruit-growing point of view.)**
Schweiz. Z. Obst-. u. Weinb., 1961, **70**: 340-8, illus.

The place of top fruit growing in mixed farms is discussed.

5783. Hilkenbäumer, F.
Möglichkeiten der Rationalisierung im Obstbau. **(The possibilities of rationalisation in fruit growing.)**
Reprint from *Vortragsreihe 14. Hochschultag. landw. Fak. Univ. Bonn, Okt. 1960*, pp. 12, illus.

Mulching, manuring, pruning, plant protection, harvesting by machine and chemical thinning are discussed, with reference to how the high man-hour requirements of fruit cultivation, 1,000 per ha. for apples and pears and 2,000 for cherries, can be reduced to make it more economic and efficient.—Inst. Obstb., Bonn.

5784. Brooklyn Botanic Garden.
Fruits in the home garden.
Plants and Gdns, 1961, **17**(1): 4-96, illus.

A wide selection of articles on home fruit growing, covering temperate, sub-tropical and tropical fruits and their culture in various regions of the U.S.

5785. Filinger, G. A., and Abmeyer, E.
The Doniphan apple orchard.
Bull. Kans. agric. Exp. Stat. **436**, 1961, pp. 22, illus.

Observations made over a period of 20 years in an experimental orchard in Kansas are summarized, and some of the results are recorded in tables. The factors studied were varietal performance, hardy rootstocks, terracing, chemical weed control, pest and disease control and fruit thinning sprays.

5786. Dragavcev, A. P.
A new region of fruit growing in the mountains. [Russian.]
Vestn. sel'sk. Nauki, 1961, **6**(3): 95-100, bibl. 10.

Studies were conducted over 14 years on apple cultivation in the Zaili Ala-Tau range of the Tian-Shan mountains, which is subdivided into 4 fruit growing areas, viz. 650–900 m., 900–1,200 m., 1,200–1,500 m. and 1,500–1,800 m. above sea level. Interesting information is provided on the effect of elevation on the length of the growing season, on the longevity of the trees and on yields and fruit characters, and the effects of such factors as steepness and orientation of slopes, light, wind, soil and moisture are discussed. In the fruits of the autumn variety Aport the sugar, acid and vitamin C contents increased with altitude from 1,070 to 1,680 m., colour was best at 1,000–1,400 m., storage quality at 1,350–1,500 m. and size at 1,070 m. Yields were highest between 900 and 1,500 m. and it is concluded that elevations of 1,000–1,350 m. are most suitable for apples, especially autumn varieties. Certain hardy apples with a short growing period can be grown at altitudes up to 2,000 m., and of these Mičurin's Pepin Šafrannyj is the most suitable. [See also *H.A.*, 24: 3449.]

5787. Folley, R. R. W.
Economics of fruit farming, Report No. 6. Ten years' yields of apples and pears.
Rep. Dep. agric. Econ., Wye Coll., 1961, pp. 55, bibl. 6, 5s.

Yields are analysed from sample fruit farms in Kent from 1948 to 1957. Average yearly yields per tree acre were: dessert apples 307 bu., culinary apples 392 bu. and pears 229 bu. James Grieve, Bramley's Seedling and Dr. Jules Guyot were the most prolific dessert apple, culinary apple and pear varieties, respectively. Annual yield patterns on different farms varied for the same variety, indicating that climatic factors possibly have a smaller influence than is sometimes supposed. With Worcester Pearmain apple and Conference pear higher yields/acre were obtained with higher tree populations/acre. Higher quality fruit was found to be associated with higher yield.

5788. Rinaldi, L.
Scorcio panoramico sul costo di produzione, conservazione nel freddo ed esportazione sul mercato tedesco (Monaco di Baviera) di mele italiane di varietà Belfort, qualità prima ed extra. **(An overall survey of the cost of production, cold storage, and export to the German market at Munich in Bavaria, of first- and extra-quality Italian apples of the variety Belfort.)**
Agric. Venezie, 1961, **15**: 220-7.
A detailed analysis of data obtained from numerous fruit farms.

5789. Foytik, J.
California apricot industry. Trends and outlook.
Circ. Calif. agric. Ext. Serv. **495**, 1961, pp. 29.
Production figures, utilization (including processing) and export.

5790. Hintze, S.
Försök med körsbär vid Rånna Försöksstation. **(Cherry trials at Rånna Experiment Station.)** [English and Esperanto summaries ½ p. each.]
Medd. Trädgårdsförs. Alnarp **131**, 1960, pp. 18, bibl. 16.
F 12/1 was the best of the rootstocks tested, inducing 50% higher yields and better disease resistance in the scions tested. Twelve varieties were classified into 3 groups on the basis of yields; average fruit weights and time of harvest were also recorded. In a manurial trial the highest yields were obtained with applications of 400 kg. 40% potash/ha. plus 400 kg. sulphate of ammonia/ha.

5791. Landbouw-Economisch Instituut.
Produktiekosten van kersen en van pruimen. **(Production costs of cherries and plums.)**
Fruitteelt, 1961, **51**: 806-7.
The costs of growing plums and cherries on large and small holdings in the Betuwe have been analysed. The cost of producing 1 kg. of cherries averages 70 cents [1s. 5d.] and the average cost of producing 1 kg. of plums is 38–40 cents [10d.]. Reine Claude Verte, Early Laxton and M. Hâtif were the most expensive varieties to grow, whereas production costs for Czar, Victoria, Early Rivers and Belle de Louvain were much lower.

5792. Foytik, J.
California plum industry. Trends and outlook.
Circ. Calif. agric. Ext. Serv. **493**, 1960, pp. 34.
Production figures and economics.

5793. Morettini, A.
Il susino—coltura da considerare. **(Plums—a crop worth considering.)** [French summary 8 lines.]
Frutticoltura, 1961, **23**: 145-51, bibl. 1, illus.
Annual production figures for plums and prunes in Italy are given for the period 1935-59 inclusive, and changes in the export market are discussed. Suitable varieties for increasing exports are recommended.

5794. Skepper, A. H., and others.
Production of prunes under irrigation.
Agric. Gaz. N.S.W., 1960, **71**: 606-10, illus., and 653-8, illus.; 1961, **72**: 32-5, illus., and 199-202, 215.
Land preparation and planting techniques, cultivation and cover-cropping including the management of burr medick (*Medicago denticulata*), fertilization, pruning, determination of maturity, harvesting methods and irrigation.

5795. Ingram, J.
A comparison of fruit tree ties.
Exp. Hort., 1961, No. 4, pp. 68-70.
Nine types of tree tie were compared in an exposed position over a 5-year period on young bush apple trees on M.II. Hop string and stout coir yarn were found to be cheap and lasted for 3–4 years. Plastic hose also made a good tie. Proprietary ties did not give a high enough performance to justify their extra cost.—Luddington exp. Hort. Stat.

Breeding and varieties.

(*See also* 7288.)

5796. Brookes, R. M., and Olmo, H. P.
Register of new fruit and nut varieties, list 15.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 725-58.
This list includes brief descriptions of 2 almond varieties, 44 apples and apple rootstocks, 8 apricots, 7 avocadoes, 7 blackberries, 2 blueberries, 2 butternuts, 1 carob, 3 cherries, 12 chestnuts, 1 citrangedin (calamondin × citrange), 6 black and red currants, 2 elderberries, 2 filberts, 2 gooseberries, 13 grapes, 1 grapefruit, 2 guavas, 1 heartnut, 4 hicans (hickory × pecan), 2 hickories, 1 macadamia, 1 mandarin, 3 mangoes, 7 nectarines, 7 oranges, 35 peaches, 7 pears, 10 pecans, 8 persimmons, 25 plums, 14 raspberries, 2 sandcherries, 56 strawberries, 2 tangelos, 14 walnuts and 2 white sapotes.

5797. Isaev, S. I.
Experiments on the production of apple trees with different growth habits. [Russian.]
Agrobiologija, 1960, No. 6, pp. 815-23, bibl. 2, illus.
In an attempt to find forms of tree habit suitable for growing in the north and east of Russia seedlings with a spreading or trailing habit were selected from the progeny of crosses between various cultivated varieties. In the first generation of seedlings 6·8–13·3% were of spreading habit, and in the second generation 29·7–50·0%. Peroxidase activity in the leaves of spreading and trailing forms

was found to be lower than in those with a normal growth habit. A new fastigiate seedling of ornamental interest is also described and illustrated.

5798. Dullum, N.
Antonius-aeblet. **(The Antonius apple.)**
Erhvervsfrugtavl., 1961, **27**: 198-9.

A cross from Wealthy × Cox's Orange, raised at Blangstedgård, is described.

5799. Schwartze, C. D.
The Ohlson apple.
Fruit Var. hort. Dig., 1961, **15**: 51-2, illus.

A large-fruited dual-purpose apple.

5800. Lobanov, G. A.
The heredity of seedling pears obtained from interspecific hybridization. [Russian.]
Agrobiologija, 1960, No. 6, pp. 932-4.

Tonkovetka, a middle-Russian variety of *Pyrus communis*, was crossed with Bessemjanka, another variety of *P. communis*, and with *P. heterophylla*. In some cases a better set of fruit was obtained by mixing the pollen of the 2 pollinating varieties. The percentage of the offspring showing the characters of *P. heterophylla* was greatest when pollen of this species was mixed with Bessemjanka pollen in the proportion of 9:1.

5801. Zwintzscher, M.
Kirschenzüchtung. Eine historische Übersicht. **(Cherry breeding. A historical review.)**
Gartenbauwiss., 1960, **25**: 151-61, bibl. 50.

The progress in breeding both sweet and sour cherries from antiquity to the present day, in all of the main cherry growing regions of the northern hemisphere, is reviewed. Particular reference is made to frost and disease resistance and to improvements in fruit characteristics.—Max-Planck-Inst. ZüchtForsch., Köln-Vogelsang.

5802. Washington Agricultural Experiment Stations.
Chinook and Rainier. New [sweet] cherry varieties.
Stats Circ. Wash. St. agric. Exp. Stats **375**, 1960, pp. 3.

Chinook has large, firm, mahogany-skinned fruit which ripens 4 to 10 days earlier than Bing. Rainer, a yellow-skinned early variety, combines the hardiness of Van with the large, firm fruit of a Napoleon-type cherry.

5803. Maurer, K. J.
Die Sauerkirschsorte Tschernokorka. **(The sour cherry variety Tschernokorka.)**
ErwObstb., 1961, **3**: 124-5, illus.

Experience over 15 years with more than 1,000 trees has shown this variety to be specially suitable for the fruit juice industry. It should be planted at 5 × 5 m. on *Prunus avium* seedling or F 12/1 rootstocks. It is not susceptible to brown rot, gummosis or shot hole and is frost hardy. Harvest is two weeks earlier than for Schattenmorelle, and 10-year-old trees will give an average yield of 50 kg. per tree. Suitable polinators are Maraschka and Kassins Frühe.

5804. Taylor, J. C., Miller, A. C., and Woodward, R. S.
Peach varieties for north Louisiana.
Circ. La agric. Exp. Stat. **68**, 1960, pp. 12, illus.

Flowering and fruit-ripening dates and chilling requirements are given for numerous peach varieties, and recommendations are made mainly on the basis of fruit characters.

5805. Bradt, O. A., and Fisher, D. V.
Vedoka, a new peach for British Columbia.
Fruit Var. hort. Dig., 1961, **15**: 42.

And for other areas where bacterial leaf spot is not a problem.

5806. Phillips, E. L.
Nectarines for Virginia.
Circ. Va Polytech. Inst. **867**, 1960, pp. 2.

Redbud, Lexington, Redchief and Cavalier are recently introduced commercial varieties [see also *H.A.*, 30: 3247].

5807. Glebova, E. I., and Ščukina, V. F.
Black-fruited *Sorbus* in the Leningrad region. [Russian.]
Sadavodstvo, 1961, No. 2, p. 28, illus.

The edible black-fruited *Sorbus* (mountain ash) is well suited to the climatic conditions of this region. Buds appear at the end of April, but blossoming occurs at the end of June when the tree is in full leaf, and therefore the flowers are not damaged by late frost. The trees cease growing early and are very winter hardy. The fruit weighs from 1·3 to 1·8 g. and has an acid-sweet flavour without bitterness. It contains 7·5–9·5% sugars, 0·4–0·5% tannins, 1,555 units of vitamin P, and 31 mg. vitamin C per 100 g. dry weight. Propagation is by stratified seeds or by root suckers taken from selected mother plants in May or September.

Propagation and rootstocks.

(*See also* 5626, 5790, 5803, 5829, 5868, 5884, 6114, 6652.)

5808. Blair, D. S., and others.
Pomology.
Progr. Rep. Hort. Div., centr. exp. Fm, Ottawa, 1954-58, 1960, pp. 9-21, illus.

At the end of the twenty-second year of a rootstock trial the Malling stocks M.IX, II and I cannot be recommended for the Ottawa area, as they are not sufficiently hardy. Among the vigorous stocks *Malus baccata* is preferred to M.XII because of root hardiness. In trials of 11 stembuilders Antonovka gave the most satisfactory results and is preferred for commercial use. A table is given of the winter hardiness of some stocks from Sweden, Germany, England and Canada. Recommendations are given for the propagation of *Malus robusta* 5 by softwood cuttings. Foliar sprays of GA helped to overcome the transplanting shock to plants of *M. robusta* 5. Apple seeds were successfully stratified when surrounded by moistened peat-moss in sealed polythene bags. Growth phases in apple and pear have been studied, including the effect of pruning on juvenility, and the rooting of cuttings from plants in the juvenile phase.

5809. Longley, R. P.
The variability of trunk cross-sections and yields of Fameuse and McIntosh apple trees grown on three clonal and two seedling rootstocks.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 11-15, bibl. 3.

Fameuse and McIntosh apple trees were grown on 3 clonal rootstocks (M.I, II and XII) and 2 seedling rootstocks (Anis and Beautiful Arcade) and the variability in yield and tree size was compared over a period of 26 years. The data suggest that trees grown on the clonal rootstocks were as variable as those grown on the seedlings. Variability decreased as the trees matured, particularly in respect of yields.—Kentville Res. Stat., N.S.

5810. McKenzie, D. W.
Rootstock-scion interaction in apples with special reference to root anatomy.
J. hort. Sci., 1961, **36**: 40-7, bibl. 16.

Bark percentages, wood-ray percentages and vessel sizes were determined on roots from 4-year-old apples trees of a rootstock-scion interaction trial. This trial contained unworked rootstocks and all 16 possible combinations of M.IX, M.IV and M.XVI, used both as rootstocks and as scions. The root structure of unworked Malling rootstocks was constant and could be correlated with the potential vigour of the selections. When stocks and scions representing extremes of vigour were combined, some modifications of the inherent root structure of the clonal rootstocks were apparent, and these could be attributed to scion influence. In general the differences were not, however, as great as those between unworked or self-budded rootstock clones. Restriction of tree growth, either by the use of a dwarfing scion or rootstock or by natural flowering and fruiting, was associated with an increased proportion of bark tissue in the roots, an enlargement of wood-ray tissue, and sometimes with diminution of vessel size. [Author's summary.]—E. Malling Res. Stat., Kent.

5811. McKenzie, D. W.
A note on vessel structure in the xylem of roots of M.XVI apple rootstock.
J. hort. Sci., 1961 **36**: 138, bibl. 4, illus.

Delicate reticulate to scalariform perforation plates provide a diagnostic feature of this rootstock. —E. Malling Res. Stat., Kent.

5812. Miller, S. R., and Heeney, H. B.
Physiological studies of the dwarfing factor in apple rootstocks.
Progr. Rep. Hort. Div., centr. exp. Fm, Ottawa, 1954-58, 1960, pp. 53-4.

In studies to determine whether there is a relationship between the vigour of a tree and its respiration rate, it was shown that 7 of 18 *Malus baccata* seedlings had significantly lower respiration rates than *M. robusta* 5, a vigorous rootstock.

5813. Korovin, V. A.
Rootstock-scion incompatibility in apples. [Russian.]
Sadovodstvo, 1961, No. 1, 23-5, illus.

Incompatability in 3 forms is described. (1) Dark areas of dead cells are found in the cortex and woody tissue of the rootstock, and in the autumn large amounts of starch and oils are found in the rootstock cells. The plant appears healthy, but when the disorder affects the whole of it growth is suppressed and the roots die off. (2) Grafting is successful and the phloem tissue unites well, but later callus tissue develops at the union and in a strong wind the stem breaks off. (3) Plants which at first appear healthy become stunted within 2 years and develop a swelling at the point of union. Shoot growth ceases early, and leaves show premature yellowing and fall at the end of August. In the autumn the rootstock tissues contain very little or no starch and the frost resistance of the root tissues is considerably reduced.

5814. Tarasenko, M. P.
The productivity of apple trees raised from grafts taken from young non-fruiting trees. [Russian.]
Agrobiologija, 1960, No. 5, pp. 780-2.

Young trees were raised from scions of two 34-year-old fruiting trees of the variety Papirovka. Subsequently further trees were raised both from the mature trees and from the young trees before they came into bearing. The growth and cropping of these two sets of trees were compared and were found not to differ from each other.

5815. Batjer, L. P., and Schneider, H.
Relation of pear decline to rootstocks and sieve-tube necrosis.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 85-97, bibl. 12, illus.

Evidence is presented indicating that pear decline is a bud union disorder associated with certain rootstocks. Symptoms result from a series of anatomical changes which are initiated by a necrosis of sieve tubes immediately below the bud union. The relatively low level of starch found in the roots of affected trees suggests that phloem degeneration at the union prevents translocation of carbohydrates to the roots, resulting in a weakening or death of the root system. Evidence indicates that the disorder is not an inherent incompatibility of stock and scion, but an induced one, though the primary causal factor has not yet been determined. Macro symptoms were found to be helpful in determining whether trees were affected with pear decline, but positive diagnosis could be made only by anatomical examination of the phloem at the bud union. Pears on the oriental rootstocks *Pyrus serotina* and *P. ussuriensis* were found to be highly susceptible to pear decline; those on imported French (*P. communis*) were intermediate, and those on domestic Bartlett seedlings (*P. communis*) were highly resistant. [From authors' summary. See also *H.A.*, 31: 3880.]—Wash. St. Univ., Wenatchee, and Univ. Calif., Riverside.

5816. BLODGETT, E. C., AND AICHELE, M. D.
The association of a red-leaf condition of pear trees with pear decline.
Plant Dis. Reptr, 1960, **44**: 904-7, bibl. 4.

When the roots of trees showing premature red colouration of the foliage were examined they showed degeneration, and the trees exhibited decline the following year. The red colouration was more common in trees on oriental rootstocks (*Pyrus ussuriensis* and *P. serotina*) than on Bartlett or French pear rootstocks. [See also *H.A.*, 31: 2182.]—Irrig. Exp. Stat., Prosser, Wash.

5817. BLODGETT, E. C., AND AICHELE, M. D.
Behavior of some Bartlett pear trees on their own roots.
Plant Dis. Reptr, 1960, **44**: 438-40, bibl. 6, illus.

Good growth and high yields were recorded on Bartlett trees that had scion-rooted; the data are being used in pear decline studies.

5818. HILDEBRANDT, W.
Keimungsphysiologische Studien an Steinobst. IV. Untersuchungen zur Ermittlung der Mindeststratifikationsdauer bei verschiedenen Steinobstarten. (**Studies on the physiology of germination in stone fruits. IV. Investigations to determine the minimum stratification period required for various stone fruits.**) [English and French summaries ⅓ page each.]
Gartenbauwiss., 1960, **25**: 162-73, bibl. 8.

The following minimum stratification periods were found: *Prunus mahaleb* 10–12 weeks, *Prunus avium* 15–16 weeks, *Prunus avium* varieties 16–18 weeks, *Prunus persica* 14–16 weeks. *Prunus myrobalana* 14-16 weeks, and *Prunus damascena* more than 20 weeks. The stony shells delay the initiation of germination by 4–5 weeks in myrobalans and peaches, and their removal extends the effective temperature range for after-ripening. Treatment with concentrated H_2SO_4 had no effect on the stratification period required by myrobalans; with peaches it resulted in a decreasing percentage germination with increasing time of treatment. [For parts II and III see *H.A.*, 31: 1930 and 1931.] —Inst. Obstb. Baumsch, tech. Hochsch., Hannover.

5819. FOGLE, H. W., AND MCCRORY, C. S.
Effects of cracking, after-ripening and gibberellin on germination of Lambert cherry seeds.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 134-8, bibl. 2.

To obtain a high germination percentage in Lambert cherry seeds it was found necessary to crack the seeds (remove the stone and puncture the seed coat) unless more than 6 months of after-ripening treatment at 35° F. was given. Cracking was also necessary for GA to be absorbed in sufficient quantity to affect germination. Sphagnum moss was a better after-ripening medium than coarse sand. With cracked seed a good germination was obtained with 4 months of after-ripening. Soaking the seed for 24 hours in 100–400 p.p.m. GA increased the percentage germination of cracked seed during the first 3 months of after-ripening, the highest concentration being the most effective. Soaking in GA did not remove the rosetting tendency of insufficiently after-ripened plants, but foliar sprays of GA did reduce this tendency. [For earlier work see *H.A.*, 29: 2110.] —Irrig. Exp. Stat., Prosser, Wash.

5820. OLNEY, H. O., AND POLLOCK, B. M.
Studies of rest period. II. Nitrogen and phosphorus changes in embryonic organs of after-ripening cherry seed.
Plant Physiol., 1960, **35**: 970-5, bibl. 11.

During after-ripening at 5° C. N and P are translocated from the storage to the potentially growing organs of the cherry seed. The rate of translocation of N is equal to the rate of cell division, so the N concentration per cell remains constant. However, the rate of translocation of P is in excess of cell division and the concentration of P in the cells increases. Fractionation experiments suggest that the translocated P moves through normal synthetic pathways into all phosphate compounds in the cells. However, in seeds held moist at 25° C. and not progressing toward the growing condition, P tends to shift from the normal compounds such as nucleic acids and accumulate as inorganic phosphate. Although these data suggest that the rest period may be associated with a block in the phosphate metabolism of the cells, this interpretation cannot be fully substantiated.

[From authors' summary. For part I see *H.A.*, 30: 171.]—Univ. Delaware, Newark.

5821. Tabuenca, M. C.
Incompatibilidad entre patrón e injerto. IV. Comportamiento del melocotonero con distintos patrones clonales del género *Prunus*. **(Stock-scion incompatibility. IV. The reaction of peaches to different clonal rootstocks of the genus *Prunus*.)** [English summary ¼ p.]
An. Estac. exp. Aula Dei, 1960, **6**: 173-80, bibl. 15.

The rootstocks which proved compatible with the peach varieties Hale's Early and Duraznilla de Sástago were Brompton (*Prunus domestica*), Ackermann (*Prunus* sp.), a peach × almond hybrid and the Damas (*P. insititia*) clones A, B, C and P_{12}. The results with Marianna (*P. cerasifera* × *P. munsoniana*) varied from the full manifestation of incompatibility to apparent compatibility, but with Myrobalan B (*P. cerasifera*) incompatibility was evident in all cases. [For parts I-III see *H.A.*, 26: 2446 and 27: 97.]

5822. Scaramuzzi, F., and Siddi, G.
Ricerche sull'epoca più opportuna per il taglio dei soggetti innestati ad "occhio dormiente". **(An investigation on the most suitable time for cutting back budded [peach] stocks during dormancy.)** [English summary ¼ p.]
Riv. Ortoflorofruttic. ital., 1961, **45**: 3-15, bibl. 8, illus.

In a trial on one-year-old wild seedling peaches budded with Fertilia Morettini when dormant, 3 treatments were applied at 4 different dates: (1) cutting back to 2 cm. above the point of budding, (2) disbudding above the union, (3) ring-barking 2 cm. above the point of budding. The earlier in the season that the treatments were applied the more vigorous were the basal shoots of the seedling rootstocks. Doubtless because growth-inhibiting substances cannot reach them through the parenchymatous tissues of the union, shoots from the inserted buds showed the opposite trend, being more vigorous the later the rootstocks were cut back. For example, at the end of April the mean lengths of shoots from inserted buds on seedlings cut back on 21 January and 2 March were 14 and 26 cm. respectively, and at the beginning of June they were 72 and 88 cm. respectively. It is concluded that the rootstock should not be cut back until bud burst.—Ist. Colt. arb., Univ. Pisa.

5823. Strydom, D. K., and Hartmann, H. T.
Effect of indolebutyric acid on respiration and nitrogen metabolism in Marianna 2624 plum softwood stem cuttings.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 124-33, bibl. 27.

Differences were detected in the respiratory rates between the basal ends of treated and untreated cuttings 36 hours after treatment. By the time roots formed on treated cuttings the respiration rate was about 4 times as great in treated as in untreated tissue. Increases were detected in the total N and the protein N of the basal end of treated cuttings between the 4th and 7th day following treatment. The total N in the basal ends of untreated cuttings showed a slight tendency to increase while the protein N remained essentially constant. Auxin-treated basal ends showed a markedly higher concentration of free amino acids than untreated basal ends 48 hours after treatment. The free amino acid level of the treated tissue showed a consistent increase until roots appeared. Conversely, the free amino acid level of untreated tissue increased during the first 4 days and remained relatively constant thereafter. Callus appeared on treated cuttings within 7 days of treatment; 15 to 50% of the cuttings were rooted within 14 days. Untreated cuttings, in contrast, showed only slight callus development after 14 days, and roots did not appear for 23 days. Nitrogenous substances accumulated in the basal part of treated cuttings, apparently mobilized in the upper part and translocated as asparagine. [From authors' summary.]—Univ. Calif., Davis.

5824. Glenn, E. M.
Plum rootstock trials at East Malling.
J. hort. Sci., 1961, **36**: 28-39, bibl. 16.

Results from 5 field trials of plum rootstocks, including both established rootstocks and clonal selections from seedlings, showed that most stocks induced cropping proportional to tree size. It is suggested that plum rootstock trials can be completed by the fifteenth year. There appears to be no advantage in growing plums on their own roots rather than on rootstocks of similar vigour and cropping potentiality. The vigour of a variety grown on its own roots is generally, but not necessarily, indicative of its vigour as a stock. Seven rootstocks are recommended according to vigour. [From author's summary.]—E. Malling Res. Stat., Kent.

Climatic factors.

(*See also* 5605, 5606, 5813.)

5825. Chandler, W. H.
Some studies of rest in apple trees.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 1-10, bibl. 10.

The response of a number of apple varieties to insufficient winter chilling is reported. It was found that 6 hours of high temperature (111–113° F.) was as effective in reducing dormancy as 100 or considerably more hours of chilling at 40° F. Evidence is presented that the "rest influence" (the factor inducing dormancy) can move at least distally in twigs. It moved from unchilled twigs, across graft unions, and induced dormancy in well chilled scion shoots. Experiments also showed that the rest influence develops earlier in the basal than in the apical part of a shoot. It is suggested that periods of high temperature in late summer or autumn may cause internal activity in the trees that will delay the development of cold resistance and increase the chilling requirements for the normal opening of buds in the following spring.—Univ. Calif., Los Angeles.

5826. Baldini, E.
La difesa degli alberi da frutto dalle elevate e dalle basse temperature. **(Protection of fruit trees against high and low temperatures.)**
Riv. Ortoflorofruttic. ital., 1961, **45**: 16-53, bibl. 114, illus.

Aspects reviewed include the harmful effects of high temperatures during the growing season and in winter, cold injury during dormancy and in spring, and various frost protection measures. Ten apple, 8 pear and 36 peach varieties are listed according to cold requirements. One hundred peach varieties are listed in 5 classes according to their resistance to low temperatures in February and March. The critical temperatures are given for injury to apple, peach, pear, plum, apricot, cherry and almond at the flower bud stage, at full bloom and during fruit set.—Ist. Colt. arb., Univ. Bologna.

5827. Krasavcev, O. A.
The hardening of woody plants to extremely low temperatures. [Russian, with English summary ½ p.]
Ivz. Akad. Nauk SSSR, Ser. biol., 1961, No. 2, pp. 228-32, bibl. 6, illus.

Experiments have shown that branches of the apple variety Antonovka could be hardened to withstand exposure to — 195° C. by gradual reduction of the temperature in the hardening chamber to —60° C. over a period of 24 days. Microscopical examination of hardened tissues showed that protection from frost damage is due to the gradual dehydration of the protoplasm by the formation of ice in the intercellular spaces. [See also *H.A.*, 30: 3273.]

5828. Spangelo, L. P. S., Wilson, D., and Modderman, L. L.
Date of apple tree defoliation and its possible relationship to winter hardiness.
Progr. Rep. Hort. Div., centr. exp. Fm, Ottawa, 1954-58, 1960, pp. 29-30, bibl. 1.

The defoliation dates of Antonovka, McIntosh and Northern Spy and of their progeny appeared to be correlated with their known hardiness.

5829. Grišanov, V. S.
Increasing the winter hardiness of apples in Siberia. [Russian.]
Sadovodstvo, 1961, No. 1, pp. 26-7.

Bush apples are more winter hardy than standards since they cease growing earlier, the crown shades the soil enabling it to retain more moisture and they are not irreparably damaged by snow since broken branches are easily replaced. Hardier standards can be obtained by frameworking the less hardy varieties on the wild Siberian apple, which is more frost resistant and stronger and has a shorter period of growth. Grafting is carried out 2–3 years after transplanting the Siberian apple, on branches 2–3 cm. in diameter at a distance of 30–35 cm. from the trunk.

5830. Engel, G.
Verringerung der Frostschäden durch Blütezeitverlagerung und Bodenpflege. **(Reducing frost damage by delaying flowering and by soil treatment.)**
ErwObstb., 1961, **3**: 44-6, bibl. 1.

Flowering on 1-year-old wood of Jonathan, Golden Delicious, James Grieve and Cox on M.IX and M.IV was 4–9 days later than on older wood. Trials at Klein-Altendorf, comparing different pruning and soil treatments, showed that arcure pruning increased the number of flowers on the 1-year-old wood by 5–20%, and that mulching the soil with a 25-cm. thick layer of straw increased the total number of flowers [see also *H.A.*, 31: 1951] and also their percentage on 1-year-old wood (of Cox and James Grieve on M.IX by 9% and on M.IV by 20%). A disadvantage of the straw mulch was the lower temperatures of the air over the straw during frost. Frost damage to the flowers was found to be 10–60% less on the 1-year-old compared with the older wood.—Inst. Obstb., Bonn.

5831. Efimov, V. A.
Damage to cherry trees by low temperatures. [Russian, with English summary 11 lines.]
Izv. Timirjazev. sel'sk. Akad., 1960, No. 6, pp. 93-101, bibl. 6.

Damage to flower buds of 27 Russian cherry varieties was recorded in test winters. The critical temperature for damage was found to vary with the developmental stage of the buds and with the temperatures during the preceding weeks. During full dormancy and following a gradual decrease in temperature, the critical temperature was about —38° C. With a sharp transition from warm to cold conditions in the first half of the winter critical temperatures ranged from —19 to —29·5° C.

5832. Campbell, R. W., and Hadle, F. B.
Winter injury to peaches and grapes.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 332-7, bibl. 11.

During a 9–day period at the Kansas Station Horticultural Farm in the winter of 1958/59 the extremes of temperature ranged from +51° to —29° F. The damage suffered by 33 peach varieties and 93 grape varieties is recorded.

5833. Karnatz, H.
Der gegenwärtige Stand der Spätfrostbekämpfung im Obstbau. **(The present position in the protection of orchards against late frosts.)**
ErwObstb., 1961, **3**: 41-3, illus.

Frost protection by sprinkler irrigation, oil burners, wind machines and smoke is discussed, particular attention being paid to the different types of heater. A heating system is described which consists of a central pump with a maximum pressure of 7 atm., which supplies a fine spray of oil to the burners; the oil is burnt with a minimum of smoke. Regulation of heat production is obtained by adjusting the pressure of the pump.

5834. Witte, K., and Mayweg, F.
Kosten und Arbeitsaufwand der gebräuchlichsten Frostschutzverfahren. **(Costs and labour requirements of the commonest frost protection methods.)**
ErwObstb., 1961, **3**: 52-4, bibl. 1.

Figures are given for, and comparisons made between, the costs of different types of orchard heating and sprinkling. Assuming a basic yield in an unprotected apple spindle bush orchard of 20 tons/ha. with a production cost of 350 DM per ton, for frost protection to be economic sprinkling must assure a surplus over this figure of 3–4·5 tons, oil heating with a pump and pipe-fed supply 2·5 tons, and large chimney heaters 2·5–1·3 tons per hectare, depending on the extent of the surface protected. The effect of frequency of frosts is also considered. If frosts occur only every 2 years on an average, then the above figures must be oubled; if every 3 years, trebled.

5835. Scharringa, M.
Berekeningen over nachtvorstwering in de fruitteelt. **(Calculations on night-frost protection in fruit growing.)** [English summary 14 lines.]
Meded. Dir. Tuinb., 1961, **24**: 241-4, summary 261-2.

Two methods of frost protection are being studied on the basis of net heat loss in an orchard on a clear night. With sprinkler irrigation 2 mm. of water per hour is considered adequate for night-frost protection in orchards under Dutch conditions. An oil-fired heater which is being tested shows promise for frost protection.—Kon. ned. met. Inst., De Bilt.

5836. Aichele, H.
Geländeheizung im Obstbau. **(Heating in the orchard.)**
ErwObstb., 1961, **3**: 48-51, illus.

Heating with oil burners, the most important method of frost protection in Germany, is discussed, and the different types of heater used are considered. Propellers blowing heated air and the combination of propellers with oil heaters are described, but it is considered too early to give a final assessment of their value.—Dtsch. Wetteramt, Trier.

5837. Alma, A.
Ureumbespuiting tegen nachtvorst in 1961. **(Urea sprays against night frost in 1961.)**
Fruitteelt, 1961, **51**: 853-4, illus.

Peaches, black and red currants and strawberries were again sprayed with 0·2–0·3% urea. The results were considered promising, although frosts were too slight to make definite conclusions possible. [See also *H.A.*, 31: 3903.]

5838. Antonjuk, V. G.
Well sheltered orchards and vineyards. [Russian.]
Sadovodstvo, 1961, No. 4. pp. 21-2, illus.

The use of apricot, poplar and nut trees as windbreaks in the Crimea is discussed.

5839. Weaver, L. O.
Bruising of apples by strong winds.
Plant Dis. Reptr, 1960, **44**: 179, illus.

A description of damage attributed to high winds.

5840. Berend, I., and Dancs, Z.
Kajszifák különleges klímaeredtű levélkárosodása. **(Specific leaf damage on apricots caused by climatic factors.)** [Russian and German summaries ½ p. each.]
Kísérl. Közlem., Sect. C, 1960, **53C**(1): 65-71, bibl. 5, illus.

During the past wet summers leaf damage of unknown origin was observed on apricots all over Hungary, and in 1959 in a young bearing orchard in Transdanubia 100% leaf fall occurred in the second half of the summer. From investigations conducted in this orchard it is concluded that the increased transmission of blue light by the rain-washed air enhanced cuticular transpiration, but that the high humidity reduced evaporation, and injury followed by heavy leaf fall resulted.

Soil management and irrigation.

(*See also* 5830, 6096, 6097.)

5841. van der Kloes, L. J. J., and others.
De fruitteelt op zandgrond. **(Fruit growing on sandy soil.)** [English summary 12 lines.]
Meded. Dir. Tuinb., 1961, **24**: 296-302, 312, 330, bibl. 13, illus.

The 3 main factors shown by a soil survey to be of importance in determining the suitability of a sandy soil for fruit growing are its fertility, the depth to which roots can penetrate and the drainage capacity of the soil.

5842. Lammel, K.
A gyümölcsösök talajművelésének gépesítése. **(Mechanization of soil cultivation in orchards.)**
Mezőgazdasági Világirodalom, 1960, **2**(3): 68-77, bibl. 15, illus.

A brief review of methods and implements.

5843. Engel, G.
Der Einfluss verschiedener Bodenpflegemassnahmen auf Obstgehölz und Boden. (**The influence of various soil treatments on fruit trees and on the soil.**)
ErwObstb., 1961, **3**: 125-8, bibl. 1.

See *H.A.*, 31: 1951.

5844. (Doll, C. C.)
Bluegrass and grama best orchard covers.
Ia Fm Sci., 1961, **15**(10): 13.

Ratings of cover crops 8 years after seeding showed that bluegrass, bromegrass and orchardgrass were 100% established and spreading. Bluegrass and side-oats grama were the best. [For earlier work see *H.A.*, 29: 3245.]

5845. Bojko, I. N.
Soil management in an irrigated orchard.
Sadovodstvo, 1961, No. 3, p. 18.

Perennial cover cropping with lucerne and brome grass is recommended.

5846. Rubin, S. S., and others.
Orchard soil maintenance. [Russian.]
Sadovodstvo, 1961, No. 3, pp. 14-16.

Papers read at a symposium are summarized. Results of trials over 30 years showed that yields were doubled, the costs of production reduced by 75% and the growth of the trees increased by 80% in orchards where the inter-rows were maintained under clean cultivation, compared with those with inter-rows under sod. Apple trees growing in pots watered with tap water grew more vigorously than those watered with drainage water from soil in which rye grass and couch grass were growing, and it is suggested that the grasses, especially couch, contain substances toxic to the trees.

5847. Mukula, J., and Säkö, J.
Chemical weed control in fruit crops, experiments conducted in 1956-60. [Finnish summary 1 p.]
Valt. Maatalousk. Julk. 189, 1961, pp. 26, bibl. 47, illus.

A wide range of herbicides was tested in mature plantations of apples, currants, raspberries and gooseberries. The most promising materials for use under Finnish conditions were amitrole, simazine and atrazine. A mixture of amitrole and simazine is recommended for the control of well-established populations of perennial weeds.—Agric. Res. Centre, Helsinki.

5848. Gamble, S. J., and Kenworthy, A. L.
Soil pH in relation to different liming materials applied to an apple and a peach orchard.
Quart. Bull. Mich. agric. Exp. Stat., 1961, **43**: 695-9, bibl. 10.

Eight liming materials were compared using surface applications of 2 tons per acre. The changes in soil pH were measured by standard methods after 3 years for the peach orchard and 5 years for the apple orchard. Limestone in hydrated form proved more effective as an acid neutralizer than carbonates. In addition, dolomitic hydrate will supply Mg to the soil.

5849. van Rhee, J. A., and Nathans, S.
Observations on earthworm populations in orchard soils.
Neth. J. agric. Sci., 1961, **9**: 94-100, bibl. 9, and in Dutch with ½-p. English summary in *Meded. Dir. Tuinb.*, 1961, **24**: 234-40, bibl. 9.

The relationship between earthworm density and soil management was clearly observed after only 3–5 years. The effect of earthworm populations on soil productivity can only be assessed over a longer period. [See also *H.A.*, 31: 3579.]—Inst. toegep, biol. Onderz. Natuur, Arnhem.

5850. Raw, F., and Lofty, J. R.
Earthworm populations in orchards.
A.R. Rothamsted exp. Stat. 1960, 1961, p. 157.

An experiment carried out with fallen leaves in cages confirmed previous findings that earthworms buried more leaf material in arable than in grassed orchards, and that the quantity buried in the latter was closely related to the weight of the earthworm population [see *H.A.*, 29: 3244]. Doubling the number of leaves per cage resulted in an increase in the number buried.

5851. Val'kov, V. F.
The ground water table in the orchard. [Russian.]
Sadovodstvo, 1961, No. 4, p. 11.

Salts found in solution in the soil included calcium bicarbonate, calcium sulphate, sodium bicarbonate, magnesium bicarbonate, magnesium sulphate, calcium chloride, magnesium chloride and sodium chloride. The maximum height of the water table which can be tolerated by apples, pears, apricots, peaches and cherries is tabulated for different amounts of dissolved salts. With less than 0·5 g./l. of dissolved salts the water table may rise to 1·0–1·5 m., whereas with 6·0 g./l. of dissolved salts water tables above 2·5–4·0 m. will cause injury.

5852. Rebour, H.
Particularités de l'irrigation dans les cultures fruitières. (**Information on irrigation of fruit crops.**)
Fruits et Prim., 1961, **31**: 63-7, illus.

The irrigation of temperate and subtropical orchard trees in North Africa is discussed. The water requirements of different species under semitropical conditions with 450–500 mm. rainfall per annum are given in 4 classes: (1) annual requirements 5,000–7,000 cu. m. per ha. and minimum seasonal requirements (at time of greatest demand) 40 cu. m. per day—citrus; (2) annual requirements 3,000–4,000 cu. m. per ha. and seasonal requirements 20–25 cu. m. per day—apricot on plum, quince, fig, pomegranate; (3) annual requirements 2,000–3,000 cu. m. per ha. and seasonal requirements 20–25 cu. m. per day—late peach on seedling stock, mid-season pear on quince, plum; (4) annual requirements 1,500–2,000 cu. m. per ha. and seasonal requirements 15–20 cu. m. per day—apricot on seedling stock, almond, dessert grape.

5853. BALLINGER, W. E., AND HUNTER, A. H.
Peach irrigation.
Res. and Fmg, N.C., 1960, **18**(4): 14.

Supplementary watering of Redhaven peaches during a severe drought resulted in the number of fruits under 2 in. in diameter being reduced by 9%, those from 2–2¼ in. being increased by 70%, and those of over 2¼ in. being increased by 126%. Fruit maturity and red coloration were not affected.

Nutrition and tree composition.

(*See also* 5651, 5652, 5654, 5655, 5657, 5759, 5790, 5797, 5879, 5902, 7264.)

5854. WALKER, D. R., AND KOLBE, M. H.
Fertilization of apple trees in North Carolina.
Folder N.C. agric. Ext. Serv. **195**, 1961, 1 folded sheet, illus.

Application rates and methods for N, P, K, Mg, B and Zn, and a brief note on sod cover.

5855. RUBIN, S. M., AND BIČUCKIJ, G. S.
Fertilizer application by means of a hydroborer. [Russian.]
Sadovodstvo, 1961, No. 3, pp. 27-8, illus.

Fertilizer solution was applied by soil injection to 5–7-year-old apple trees growing in black fallow soil. The solution was contained in 2 tractor-mounted tanks, which each had a capacity of 900 l. with a 5 atm. pressure. It was injected into the soil around the trunks at a distance of 0·7–1 m., to a depth of 30–40 cm., by manually operated hydroborers. In the spring a 1% soultion of ammonium nitrate was applied, and in July 0·25% ammonium nitrate, 1% superphosphate and 0·5% potassium salts.

5856. ROM, R. C., AND ARRINGTON, E. H.
Effect of time of nitrogen application on peach trees.
Arkans. Fm Res., 1961, **10**(1): 5.

Application of N fertilizer up to 3 weeks after bloom caused no reduction in productivity either in the current or subsequent seasons, compared with the traditional pre-blossom application of N.

5857. REBOUR, H.
À la recherche de l'équilibre entre la fumure azotée et l'alimentation phosphopotassique des arbres fruitiers. **(An investigation of the balance between the nitrogenous manuring and the phospho-potassium nutrition of fruit trees.)**
Rev. hort., Paris, 1961, **133**: 41-3, bibl. 1, illus.
La fumure phospho-potassique des arbres fruitiers en culture irriguée. **(Phosphate and potash manuring of irrigated fruit trees.)**
C.R. Acad. Agric. Fr., 1961, **47**: 223-6, bibl. 2, illus.

The penetration of P and K fertilizers in the soil is slow, so deep placement is essential in orchards of mature trees where these elements have not been supplied liberally at planting. This is particularly important with the modern tendency to intensive N manuring. A special sub-soiler is described which provides the most economic means of deep placement. To prevent exhaustion of soil moisture by root concentration in the regions of placement, the irrigation furrows should be cut in the path of the sub-soiler.

5858. O'GRADY, L. J.
Rapport azote-potassium de la feuille du pommier McIntosh vs production, coloration et conservation des fruits. **(The N/K ratio of McIntosh apple leaves in relation to fruit production, coloration and storage quality.)**
Rev. d'Oka, 1960, **34**: 152-4.

See *H.A.*, 31: 2022.

5859. QUIDET, P., RICHARD, H., AND PETIT, P.
Influence de la fumure sur le rendement, les conditions de maturation et l'aptitude à la conservation des pommes (variété Starking Delicious). **(Effect of fertilization on yield, conditions of maturation and cold storage quality of Starking Delicious apples.)**
C.R. Acad. Agric. Fr., 1961, **47**: 130-5, bibl. 2.

The effects of K and N were investigated in a trial laid down in 1948 at Baigts-de-Béarn on soil low in P and K. The treatments were NP, NPK, NPK_2 and N_2PK_2 and the rates of application were gradually increased to maxima of 100–120–0, 100–120–150, 100–120–220 and 150–120–220, respectively, in 1957/59. The mean annual yields (1955–59) were 11·8 tons of fruit per ha. with NP, 17·7 with NPK, 18·8 with NPK_2 and 16·6 with N_2PK_2, respectively. The mean annual number of fruits per tree were 131, 176, 182 and 176, respectively. The mean weights per fruit were 132, 157, 158 and 146 g., respectively. When ripened for 15 days at 20° C. only the fruits of the NPK_2 treatment reached the highest quality. After cold storage at 0° C. from 30 September the NPK fruits showed much better commercial quality than the fruits from the other treatments on 29 October, but they had deteriorated by 14 November when all the fruits were of equal and moderate quality.

From December until the end of January fruits from the NPK_2 treatment were of better quality than the others. It was concluded that K is indispensable for good maturation and prolonged storage of Starking Delicious.

5860. BEATTIE, J.
Potassium aids in developing better apple color.
Ohio Fm Home Res., 1959, **44**: 72-3, illus.

Leaf analysis showed that soil applications of potassium chloride raised the K content of Rome Beauty leaves more effectively than foliar sprays of potassium sulphate, and gave higher yields with a higher percentage of well coloured apples.

5861. MORI, H., YAMAZAKI, T., AND ABE, I.
On the potassium nutrition of apple trees.
Japanese Potassium Symposium, 1958, pp. 37-59, bibl. 11, illus.

Young non-bearing apple trees of the varieties American Summer Pearmain, McIntosh, Jonathan, Starking and Ralls, grown at Tohoku in culture solution, absorbed K at a rapidly increasing rate after bud burst and then at a relatively constant rate until shoot growth ceased. The decrease during autumn was moderately rapid, and from late November to mid-April the roots returned some K to the solution. During shoot growth 80–90% of the year's K uptake was absorbed. When the trees began bearing, however, only 45–65% of the total K was absorbed during shoot growth, after which the rate decreased gradually during fruit growth and rapidly after harvest. There was again some K excretion during winter. Varietal differences, negligible in non-bearing trees, were more evident in bearing trees. When 8-year-old trees of American Summer Pearmain, Jonathan and Ralls were grown in culture solutions with 0, 60, 40 and 100 p.p.m. of K, leaf scorch appeared in the first season in all the varieties at 0, and in Ralls at 10 p.p.m. In the first year the yield was little affected, but the sugar/acid ratio of the fruit increased and fruit size decreased with reduction of K supply. Graphs show the effects of K level on leaf K, on the K content of the fruit and juice, and on the average weight per fruit. In the second year low K reduced the number of buds opening and the size of the leaves. Other effects will be reported later. Non-bearing trees of Ralls were grown for 3 years in sand culture, with N/K ratios varying from 1:8 to 8:1. The 8:1 treatment resulted in poor growth and leaf scorch in the first year, with progressive deterioration. The 4:1 treatment produced leaf scorch in the third year. The symptom evidently developed when the absorption ratio of N/K was 2·5 or greater, but the K contents of the affected leaves were above the 0·75–1% usually regarded as the threshold value of K deficiency. The 1:8 treatment resulted in an absorption ratio of 1:7·85 and caused a severe check to Mg absorption. The effects of differences in the N/K ratio on leaf number, shoot length, trunk girth, water absorption, uptake of N, K, Ca, Mg and P during the growing season and leaf composition in July are tabulated. Further data are presented on the number of fruits per tree, the average weight per fruit, the sugar and acid percentages in the juice, the incidence of bitter pit and the colour and inorganic composition of the fruit as affected by the different N/K ratios. —Tohoku agric. Exp. Stat.

5862. ROORDA VAN EYSINGA, J. P. N. L.
Toepassing van ijzerchelaat ter bestrijding van ijzergebrek bij fruit op kalkrijke lössgrond. (**The use of iron chelate to correct chlorosis of fruit on calcareous loess soil.**)
Fruiteelt, 1961, **51**: 755-6, illus.

Experiments [reported in *H.A.*, 30: 4896] were repeated to develop their practical use. The chelate Chel Fe 138 (Fe-EDDHA) generally gave satisfactory results when applied in solution to the soil at 4, 8 or 12 g. per sq. m. according to the severity of the chlorosis.—Inst. Bodemvr., Groningen.

5863. RECKENDORFER, P.
Die Kalkchlorose in ihren Beziehungen zum Eisen. Der Chelatbildner. III Teil: Modellversuch im Obstbau. (**Lime-induced chlorosis in relation to iron. The chelate donor. III. Pilot trial in the orchard.**) [English summary 9 lines.]
PflSch. Ber. Wien, 1961, **26**: 65-81, bibl. 11.

The cause of lime-induced chlorosis in pear leaves appears to be a disturbance in the synthesis of the co-factor (an Fe-protoporphyrine complex). This may lead to a deficiency of the organic chelate donor (protoporphyrine), a deficiency of the acceptor (Fe) or a simultaneous deficiency of both. [For part II see *H.A.*, 30: 209.]—Lab. Bundesanst. PflSch., Wien.

5864. DE HAAS, P. G., AND GRUPPE, W.
Die Bedeutung des Magnesiums für die Ernährung der Obstgehölze. (**The significance of magnesium in fruit tree nutrition.**)
Landw. Forsch. Sonderh. **12**, 1959, pp. 74-5, from abstr. in *Z. PflKrankh.*, 1961, **68**: 357.

When Mg deficiency is acute, affected leaves generally contain less than 0·15% Mg (dry weight), whereas normal leaves contain 0·25% Mg (dry weight). A clear negative relationship was found between the Mg and K contents of the leaves. In N.W. Germany symptoms of Mg deficiency were observed on apples when soil contents of Mg were less than 3 mg./100 g. soil. Two to five foliar sprays of magnesium sulphate acted more quickly than soil applications.

5865. Stenuit, D. F.
Beziehungen zwischen Magnesium-Gehalt und Ertrag belgischer Böden. **(The relationship between magnesium content and yield in Belgian soils.)**
Reprint from *Landw. Forsch. Sonderh.* **13**, 1959, pp. 23-9, bibl. 11.

Following soil tests in 64 apple orchards a negative relationship was found to exist between the Mg content of the soil and the severity of Mg deficiency symptoms, when the soil content of MgO was below 5 mg./100 g. soil. A second factor of importance is the level of exchangeable bases in the soil, which if relatively high can induce deficiency symptoms in the presence of high Mg contents. Soil contents of Mg may be governed by the pH value of the soil as well as by total contents of exchangeable bases. The ratio K_2O/MgO in the soil is often related to the appearance of Mg deficiency symptoms; with a ratio of >3 deficiency symptoms are nearly always severe, but with a ratio of $<1{\cdot}5$ the danger of Mg deficiency is slight.—Bodenk. Dienst, Heverlee.

5866. Trocmé, S.
La magnésie en arboriculture fruitière. **(Magnesium in fruit tree culture.)**
Arboric. fruit., 1960, **7**(82): 10-11, 13, bibl. 12, illus.

Deficiency symptoms in apples and pears, associated conditions and corrective measures.

Growth and physiology.

(*See also* 5691, 5731, 5808, 5812, 5822, 5823, 5825, 5861, 5905, 6226, 6227, 6584.)

5867. Fulga, I. G.
A simplified method for determining the area of apple leaves. [Russian, with English summary 7 lines.]
Fiziol. Rast., 1961, **8**: 255-7, bibl. 2.

The total leaf area of fruit spurs or vegetative shoots is calculated by multiplying half the total leaf length by the mean width and by a varietal coefficient which has been determined for most of the common apple varieties in Moldavia.

5868. Hancock, C. R., and Barlow, H. W. B.
Short-term fluctuations in leaf and internode growth in the apple rootstock Crab C.
New Phytol., 1960, **59**: 227-37, bibl. 16.

A method of handling data on leaf and internode growth on Crab C stoolbed shoots is described, whereby average values for leaf length, leaf width and internode length were obtained from 27 shoots with certainty that all leaves contributing to the average were passing through the same stage of development at the same time. The effect of temperature (defined as accumulated day degrees above 42° F. between noon and noon) on growth rate at 5 stages of growth of the leaf in length and width, and of the internode in length, is shown by means of linear regressions. Attempts are made to relate final leaf length with the temperature regime through which the leaf had passed; partial correlations and a multiple regression gave results which are difficult to interpret. Similar treatment of the internode data yielded a more logical relationship. "Normal curves of growth" were constructed for leaf length, leaf width and internode length. By plotting these on a common time scale certain relationships between growth of one organ and another are clarified. The effect of temperature at stages earlier than those observed in these studies is discussed. [Authors' summary.]—E. Malling Res. Stat., Kent.

5869. Vardanija, K. H.
Influence of day length on the growth and development of peach and feijoa. [Russian.]
Agrobiologija, 1960, No. 6, pp. 846-51, illus.

Peach and feijoa seedlings were grown at 10-, 12-, 14- and 24-hour day lengths. Maximum growth of the main shoot of peach seedlings occurred in continuous light, but growth of the whole seedling (i.e. including lateral growth) was greatest in a 10-hour day. Vitamin C content, photosynthesis and carbohydrate content were all highest in continuous light, whereas respiration/g. dry weight was greatest in a 10-hour day. Seedlings in continuous light flowered earliest. Maximum growth of the main shoot and of the whole plant of feijoa seedlings occurred in 10-hour days. Vitamin C content, photosynthesis and carbohydrate content were again highest in continuous light, and respiration was greatest in 10-hour days.

5870. Hořavka, B.
Microphotography of phases in the development of apple flower buds. [Czech and Russian summaries 6 lines each.]
Biol. Plant., Prague, 1961, **3**: 137-9, bibl. 4, illus.

15 microphotographs show stages of development of the floral buds in the apple variety Lord Lambourne.

5871. Zeller, O.
Entwicklungsgeschichte der Blütenknospen und Fruchtanlagen an einjährigen Langtrieben von Apfelbüschen. I. Entwicklungsverlauf und Entwicklungsmorphologie der Blüten am einjährigen Langtrieb. **(The development of flower buds and fruit primordia on one-year-old extension shoots of apple trees. I. The course and morphology of development of flowers on one-year-old extension shoots.)** [English summary 1 p.]
Z. PflZücht., 1960, **44**: 175-215, bibl. 48, illus.

The type of flower bud formed on one-year-old extension growth shows a different developmental rhythm from that of flower buds on spur wood. Flower initiation may begin in the autumn, or not until February/March. The buds on any one shoot are at different stages of development, the flowering impulse being strongest in the middle zone of the extension growth where the flowers are first formed, and becoming weaker towards the basal and apical zones. With the transition to the generative stage a meristematic plug is formed in the bud. When this plug is small the flowers will not develop normally. In contrast to spur wood, considerably more primordia are differentiated than finally develop in buds on extension growth. Many flower primordia abort at the stage of anther formation, at the pollen tetrad stage, or when the embryo sac mother cells and egg cells develop. Many flower primordia of the second order develop in the axils of bracteoles on the inflorescence, but remain rudimentary.—Inst. Obstb. Gemüseb., Hohenheim.

5872. Zeller, O.
Entwicklungsgeschichte der Blütenknospen und Fruchtanlagen an einjährigen Langtrieben von Apfelbüschen. II. Entwicklung der Fruchtanlagen und Fruchtungsvermögen am einjährigen Langtrieb. **(The development of flower buds and fruit primordia on one-year-old extension shoots of apple trees. II. The development of fruit primordia and fruiting potential on one-year-old extension shoots.)** [English summary 1 p.]
Z. PflZücht., 1960, **44**: 243-78, bibl. 68, illus.

The fruit on one-year-old extension shoots develops from regions of the shoot where there is a strong reproductive tendency. Fruit formation in such regions of the shoot is possible even if only some of the organs of the gynaeceum are formed. The seeds of extension growth fruits are less well-developed than those of spur fruits. The fruiting potential of flowers on all kinds of shoots is highest in the third year after planting, and decreases in the fourth and fifth years after planting. In the third year after planting fruits on extension growth form the largest portion of the yield, but this decreases and is of little importance by the fourth and fifth years after planting. Later the extension shoots are more important for their spur-production capacity. Embryonic development in the fruits is the same on spurs and extension shoots, beginning at 10–14 days after fertilization and being completed 8 or 9 weeks later. The thorny side-shoots produced on the shoots of young apple seedlings are considered to be inhibited extension shoots, while the axillary inflorescence buds formed on one-year-old extension shoots of young grafted trees are considered to be inhibited spurs.—Inst. Obstb. Gemüseb., Hohenheim.

5873. Nesterov, Ja. S.
Secondary flowering in fruit trees. [Russian.]
Bot. Žurnal, 1961, **46**: 266-70, bibl. 6, illus.

Late flowering can result from either accelerated or retarded bud formation. In apples bud development was accelerated and flowers were produced on scions grafted in late summer onto stumps of 10–20-year-old trees which were prepared by cutting down the crowns in early spring and then systematically removing new growth. Retarded flowering was obtained in apple and other fruit trees by grafting in the spring scions from trees which had not been winter chilled or by using, when required, scions which had been stored at 0° C.

5874. Chvojka, L.
The influence of fruits on the osmotic pressure of the cell sap of leaves and on flower-bud formation in apple trees. [Russian, with Czech and English summaries $\frac{1}{3}$ page each.]
Biol. Plant., Prague, 1961, **3**: 15-28, bibl. 14.

The osmotic pressure (OP) in 70 trees of 7 varieties, including 5 biennial varieties, was investigated in the course of 2 years. Trees 10–12 years of age on M.II, M.IX and M.IV were used. The leaves of spurs on trees with and without fruit were removed 3 or 4 times during each growing season, and their OP and the electrical conductivity of their cell sap were measured. It was found that growing fruits brought about a decrease in the OP of the leaves by 2–6 atm., depending on the amount of fruit set and the season, but largely independently of the weather. The OP of the cell sap in the buds was decreased by only 1–2 atm. A significant positive correlation was found between the value of the OP and the amount of flower-bud formation in Belle de Boskoop. In regular bearers no such correlation could be observed. [From author's summary.]—Inst. Biol., Czech. Acad. Sci., Prague.

5875. Wierszyłłowski, J., Rusek, Z., and Ugolik, M.
Zawartość wody, intensywność oddychania i hamowanie wzrostu w pąkach kwiatowych wiśni a ich okres spoczynku. **(Water content, intensity of respiration and inhibition of growth of flower buds of Morello cherries in relation to their period of dormancy.)**
[Russian and English summaries $\frac{1}{2}$ p. each.]
Roczn. Nauk rol., Ser. A, 1960, **80**: 723-39, bibl. 20.

Water content and oxygen uptake were determined every 2 weeks. Water content fell during autumn reaching its lowest value (48·3%) in January, began to increase in the 2nd half of February and rose sharply in March and April to reach a maximum (about 80%) at full bloom. Intensity of respiration was similarly highest in April and May, falling to a minimum in January. Inhibition of growth was generally strongest under Poznan conditions from January to mid-February, although the results showed some irregularity.

5876. Campbell, A. I.
Shortening the juvenile phase of apple seedlings.
Nature, 1961, **191**: 517, bibl. 1.

This was achieved by budding on to apomictic seedlings of *M. sikkimensis*; 15% of the trees flowered 3 years after budding and 53% after 4 years.—Long Ashton Res. Stat., Bristol.

5877. Dvořák, J.
Formation of secondary xylem in apricots (*Prunus armeniaca* L.) without the participation of buds. [Czech and Russian summaries 12 lines each.]
Biol. Plant., Prague, 1961, **3**: 99-106, bibl. 7.

In disbudded cut shoots of apricots normal xylem formed only when β-indoleacetic acid was applied to the sites from which the buds were removed. Where whole trees were disbudded, xylem would also form, but only at the base of the main stem. It was found that xylem formation during bud burst took place beneath the developing buds and at the base of the main stem. In 2–3-year-old branches xylem forms later. [From author's summary.]—Fruit Res. Inst., Czech. Acad. agric. Sci., Holovousy.

5878. Chiusoli, A.
Le basi istologiche degli effetti della invertita polarità di anelli di corteccia sullo sviluppo degli alberi in vivaio. (**The histological basis of the effects of inverted polarity of bark rings on the development of trees in the nursery.**) [English summary 12 lines.]
Riv. Ortoflorofruttic. ital., 1961, **45**: 54-65. bibl. 17, illus.

In investigations on young Morettini's Early Beurré pear on quince a 2-cm. ring of bark was removed in the spring and was replaced immediately either in its original position or inverted. Inverting the ring caused significantly reduced development, and examination in the autumn showed that this was due to abnormal structure of the xylem and phloem formed beneath the inverted ring of bark. —Ist. Colt, arb., Univ. Bologna.

5879. Chvojka, L., Vereš, K., and Kozel, J.
The effect of kinins on the growth of apple-tree buds and on the incorporation of radioactive phosphate. [Russian, with Czech and English summaries $\frac{1}{3}$ page each.]
Biol. Plant., Prague, 1961, **3**: 140-7, bibl. 16, illus.

Kinetin and 6-benzylaminopurine were applied to apple trees with the aim of regulating the growth and metabolism of the buds. A single dose of 20–200 μg. of kinin counteracted the inhibitory effect of the fruit on bud growth. Lower doses resulted in a thickening of buds, higher doses in the bursting of buds to form twigs. It was found with the aid of $P^{32}O_4$ that the inhibitory effect of fruits is reflected particularly in a considerable decrease in the incorporation of $P^{32}O_4$ into the fraction of free nucleotides, especially in meristematic tissues. Further, the rate of synthesis of nucleoproteins and phospholipids is considerably decreased in the buds of a fruit-bearing apple tree as compared with those of one which is not bearing. The kinins bring about a change in the metabolism of buds adjacent to fruits (both of their meristem and scale integuments), and the incorporation of radioactive phosphate after a 7-day exposure is very similar to that in buds of a non-bearing tree. Autoradiography of 6-benzylaminopurine-9-^{14}C revealed that this was localized near to the point of application, predominantly in the bark and in the phloem. It was transported very little toward the apical end, but somewhat more toward the basal end of the shoot. After a lapse of time another radioactive substance was isolated from the experimental material, differing from 6-benzylaminopurine in its Rf value. [From authors' summary.] —Inst. Biol., Czech. Acad. Sci., Prague.

5880. Brown, D. S., Griggs, W. H., and Iwakiri, B. T.
The influence of gibberellin on resting pear buds.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 52-8, bibl. 2, illus.

Dwarf pear trees growing in tubs were treated with GA sprays at different times during the dormant season. Some of the trees were moved to the greenhouse after treatment, others were left outdoors. Response to GA was shown only among the greenhouse lot of trees. With these, GA stimulated bud development only after the rest period of the buds had been partly broken by winter chilling prior to treatment. GA treatments resulted in the death of flowers within the clusters in many of the floral buds, particularly with those treatments applied early in the dormant period when the rest influence was most intense. The calyx end of fruit set on GA-treated trees was malformed. The GA effect on pear buds does not seem to be one of breaking or reducing the rest influence. Rather, it is one of growth stimulus, which is expressed by the development of buds which have emerged at least partly from their rest. The extent and nature of the response to GA is conditioned by depth of the rest influence at the time of treatment. [From authors' summary.]— Univ. Calif., Davis.

5881. Crane, J. C., and Grossi, N.
Fruit and vegetative responses of the Mission fig to gibberellin.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 139-45, bibl. 11, illus.

See *H.A.*, 31: 327.

5882. Kolesnikov, V. A.
Study of roots by the "sampling" method. [Russian.]
Sadovodstvo, 1961, No. 3, pp. 20-2, illus.

The roots of fruit plants are divided into 4 types, based on their morphological and anatomical characteristics and their physiological functions: (1) axial, (2) absorbing or active, (3) transitional, and (4) conducting. The relative proportions of the different types of root depend on the species, variety and age of the plant, the depth of the root system, the presence of moisture and nutrients in the soil and on cultural practices.

Planting and spacing.

(*See also* 5897.)

5883. Dreiling, F. R.
Establishing an apple orchard.
Circ. Va Polytech. Inst. **870**, 1961, pp. 7, bibl. 5, illus.

Planting systems, choice of pollinators and care of young trees.

5884. Večeřa, L.
Hodnocení sponu a úrodnosti vřetenovitých zákrsků jabloní v Průhonicích. (**An evaluation of the spacing and productivity of apple spindle bushes at Průhonice.**) [English, Russian and German summaries ½ p. each.]
Věd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 251-67, bibl. 16, illus.

Observations were made on 35 varieties, mostly on M.IX, in their 9th to 13th years after planting, with special reference to the quality of the crop, the area covered by the crown and the spacing. The highest average quality, and therefore the best market price, was obtained by Hornokrajský Malináč on M.IX and Boskoop topworked on V. Schöffer's Reinette also on M.IX. For the former variety the spacing used, i.e. 2·5 × 2·5 m., was optimal, whereas for Boskoop calculations indicated that 3 × 3 m. would be most suitable. The highest total yields over the 5 seasons were produced by Oldenburg topworked on Studničné on M.IX, and consistently good crops were also obtained from Wealthy on M.IX. Ontario was the most susceptible to frost injury, and Croncel and London Pippin to scab. Suitable rootstock-scion combinations with appropriate planting distances are recommended.

5885. Trusevič, G. V.
Spacing of trees in the orchards of the northern Caucasus. [Russian.]
Sadovodstvo, 1961, No. 2, pp. 19-21.

In a 12-year-old apricot orchard higher yields per ha. were obtained at a spacing of 4 × 4 m. than at 10 × 6 m. Spacings of 10 × 6 m. for vigorous and 8 × 6 m. for medium vigorous apple trees, and 8 × 6 m. or 8 × 4 m. for plums, are recommended in place of the much wider spacings hitherto employed.

5886. Kemmer, E.
Wuchs- und Ertragsleistung bei Pflaumen im engen Stand und Hinweise zur Frage der Kroneneinschränkung. (**Growth and yield performance of closely-planted plums, and information on the problem of crown restriction.**)
ErwObstb., 1961, **3**: 104-7, bibl. 5, illus.

A close stand (4 × 4 m.) of 3 plum varieties has produced average annual yields of 34,940 kg./ha. (Hauszwetsche), 17,250 kg./ha. (Mirabelle de Nancy) and 12,940 kg./ha. (Reine Claude) in their full-bearing years. In view of the necessity of thinning the plantation the author discusses work by Schulz [*H.A.*, 30: 3341], and considers that deheading the fillers will provide adequate thinning.

Pruning and training.

(*See also* 5830, 5886.)

5887. Metlickij, Z. A., and Komissarov, P. M.
Rationalization of pruning. [Russian.]
Sadovodstvo, 1961, No. 2, pp. 14-15, illus.

Better results were obtained by pruning the upper, middle and lower portions of the crown of mature fruit trees separately. The lower section of the tree was pruned by hand using secateurs and a saw, the middle section was also pruned by hand using a ladder or long-handled saw and secateurs, and the upper portion of the crown was pruned from a hydraulically-operated platform.

5888. Verbovyj, K. A.
Rejuvenation pruning. [Russian.]
Sadovodstvo, 1961, No. 2, pp. 16-19, illus.

A comparison of the effects on cropping capacity of 5 different methods of pruning apple, pear and plum trees showed that the biggest yield increases were obtained by thinning the crown and pruning in a year when crops were low or absent, followed by a second pruning 5–6 years later. In all cases the crown was spur-thinned annually.

5889. Metlickij, Z. A.
Dates of pruning. [Russian.]
Sadovodstvo, 1961, No. 4, pp. 16-19, illus.

The effects of pruning apple trees in early spring, late spring, at the time of flowering and in summer on vegetative growth and yields were compared with the effects of no pruning. Pruned trees made more vigorous growth than unpruned ones, but differences between the different times of pruning were not clear-cut. When the experiment was repeated in a year of high fruit yields, the later the pruning the weaker was the vegetative growth. Summer pruning in an "off" year decreased yields in the following "on" year. When pruning was carried out in the "on" year, the later the pruning, the higher were the yields. Late pruning reduced hardiness in the following winter.

5890. Vorobej, Z. S.
Pruning prostrate apple trees. [Russian.]
Sadovodstvo, 1961, No. 4, p. 20.

Different methods of pruning which were compared on 7-year-old fruiting trees included (1) thinning the crown of the tree, (2) thinning combined with cutting back 1-year growth by ⅓ of its length, (3) thinning and cutting back combined with the repeated pinching out of shoots not required for forming a framework when they reached 12–15 cm. Results showed that thinning was suitable for all varieties grown in prostrate form. Cutting back in the spring with supplementary summer pinching out of shoots was suitable only for winter hardy varieties with a short growing period, and on these cutting back strengthened growth and pinching out improved fruit set. On varieties with a prolonged vegetative period or those with a short vegetative period which were not winter hardy, cutting back plus pinching out prolonged growth and reduced winter hardiness.

5891. Hintze, S.
Beskärningsförsök med äpple. **(Pruning trials with apples.)**
Fruktodlaren, 1961, **32**: 62-5, illus.

First results from the Swedish section of an inter-Scandinavian pruning trial indicate that the normal Swedish method (a severe type of pruning) has delayed bearing in the early years. Trees of Cox and Gravenstein produced higher yields of better-coloured fruits when pruned according to American and Danish systems (relatively light pruning), but root anchorage of these trees could be weak, as root growth did not keep pace with top growth.

5892. Charrière, J.
Influence de la méthode de conduite des buissons de pommiers sur leur rendement. **(The influence of the method of pruning bush apples on their yield.)**
Rev. hort. suisse, 1961, **34**: 198-201, illus.

Compared with pruned trees, the yield of non-pruned 3-year-old trees on M.XIII was 4 times greater for Pomme Cloche and Golden Delicious, 8 times for Winter Banana and more than 20 times greater for Reine des Reinettes. However, after 3 years of unpruned growth some of the varieties were no longer manageable as bushes because of their size, but this criticism did not apply to Golden Delicious.

5893. Gyuró, F.
The effect of pruning on the Jonathan apple tree. [Russian, with English and German summaries ¾ p. each.]
Acta agron. hung., 1960, **10**: 245-65, bibl. 84.

The pruning methods tested in this 5-year trial were thinning and the Nagy Sándor system. The latter consists of cutting back all shoots more than 20–25 cm. long by 20–25%, thus inducing the development of 2 laterals; the following year the upper lateral is removed and the lower one shortened. The Nagy Sándor system resulted in greater spur growth and leaf development and an increased fruit set and yield per bearing tree. Correlations between vegetative and generative activity are presented which are valid for both treatments and for the unpruned control.

5894. (Tukey, H. B.)
Cherries. Secret of high yields.
Amer. Fruit Gr, 1961, **81**(5): 30.

Trees in high-yielding Montmorency orchards formed a high proportion of shoots over 6 in. long, whereas the proportion of such shoots in low-yielding orchards was low. A vigorous productive condition can be stimulated by severe pruning combined with N manuring.—Mich. St. Univ.

5895. Dreiling, F. R., and Phillips, E. L.
Pruning peach trees.
Circ. Va polytech. Inst. **726**, revised 1960, pp. 4, illus.

By hand, or with power tools from the ground or from platforms; disposal of the prunings.

5896. WECA.
Een zelfrijdende werkstelling. **(A self-propelled working platform.)**
Fruitteelt, 1961, **51**: 697, illus.

A platform 4–4½ m. high, mounted on 3 wheels, has extensions for working close into the trees and is designed for use in pruning, thinning and harvesting fruit.

Pollination and fruit set.

(*See also* 5800, 5871, 5872.)

5897. Free, J. B.
Pollination.
A.R. Rothamsted exp. Stat. 1960, 1961, p. 173.

The behaviour of pollen-gathering and nectar-gathering bees on flowers of apple, apricot, cherry, peach, pear and plum is briefly described. In Bramley's Seedling the pollen gatherers were efficient and the nectar gatherers inefficient pollinators, but both types were effective in apple varieties in which the stamens had short, thin filaments. In general, each bee visited only 2 adjacent trees before returning to the hive; thus when more than 2 rows of the main variety were planted between rows of the pollinator variety, the inner rows of the main variety tended to receive less of the effective pollen. In orchards where the spacing was wider between than along the rows, the bees worked more readily along the rows than across to successive rows.

5898. KARNATZ, A,
Untersuchungen über Parthenokarpie bei Äpfeln und Birnen. **(Studies of parthenocarpy in apples and pears.)**
Arbeit Inst. Obstb. Tech. Univ., Berlin **128**, 1960, pp. 115, bibl. 61, illus.

In bagging experiments to exclude cross pollination 123 apple varieties and 25 pear varieties were studied, and fruit set amounted to 2·1% in apples and 3·9% in pears. 70% of the apples were seedless and hence parthenocarpic, and 98% of the pears. Fruits containing seeds impaired the development of seedless fruits, and seedlessness was more marked if unfavourable weather conditions caused the drop of seed-containing fruits. According to the seed content of the fruit the apple varieties were grouped as follows: predominantly parthenocarpic, 26 varieties; parthenocarpic with pseudofertility where an appreciable number of fruits had 1–2 seeds, 19 varieties; parthenocarpic and pseudofertile with some self-fertility, the latter condition indicated by the presence of some many-seeded fruits, 8 varieties; and lastly predominantly self-fertile, 5 varieties. Rev. Wilks, Early Victoria and Lord Grosvenor showed all these types of behaviour.

5899. GRIGGS, W. H., CLAYPOOL, L. L., AND IWAKIRI, B. T.
Further comparisons of growth, maturity, and quality of seedless and seeded Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 74-84, bibl. 10.

In a comparison between the fruits of self-pollinated (normally parthenocarpic) and cross-pollinated Bartlett pears the differences in size, shape and weight between the seedless and seeded fruits were of little importance [see also *H.A.*, 28: 1115]. The earlier softening, earlier and greater soluble solids accumulation and better flavour of the seeded fruit, however, indicate that cross-pollination is desirable. The present maturity standards based on flesh firmness and soluble solids content were found to be equally satisfactory for both parthenocarpic and seeded pears.—Univ. Calif., Davis.

5900. SKREBTSOVA, N. D., AND YAKOVLEV, A. S.
The effectiveness of saturated pollination of cherries by bees. [Russian.]
Pchelovodstvo, 1959, **36**(5): 25-6, from abstr. in *Bee World*, 1961, **42**: 115.

In part of a cherry orchard with 3·8 colonies of bees per ha. fruit set was 14·9% of all flowers; with 2·8 colonies per ha. fruit set was 12·8%. As a result of the higher yield in the former section, labour productivity was increased by 5·6%.

5901. MINISTRY OF AGRICULTURE, LONDON.
The pollination of cherries.
Adv. Leafl. Minist. Agric., Lond. **486**, 1960, pp. 5.

A table of incompatibility groups and flowering seasons.

Flower and fruit thinning.

(*See also* 7288.)

5902. LORNE, P.
L'éclaircissage chimique des fruits. (Pommiers). **(Chemical fruit thinning of apples.)**
C.R. Acad. Agric. Fr., 1961, **47**: 218-23.

On apple trees treated with NAA at 9, 12 and 15 p.p.m. the degree of fruit thinning was proportional to the concentration of NAA, the number of clusters bearing more than one fruit decreased with increasing concentration, and the greater the original number of fruits set, the more effective was the action of NAA. This last observation applied also to the different parts of individual trees. There was no reduction in the crop from treated trees of low productivity, and in some instances these finally produced more fruits of larger size than those from comparable untreated trees. There were considerable differences among varieties in response to NAA treatment, and those showing a high percentage of thinning also responded best to pre-harvest application of NAA for preventing fruit drop. Thinning by NAA is considered the best means to date of minimizing biennial bearing. Possible connections between the thinning action of NAA and the B nutrition of the tree are briefly discussed.

5903. GUNAR, I. I., AND KALINKEVIČ, M. I.
Regulating flowering and fruiting in apples by means of chemicals. [Russian, with English summary ¼ p.]
Izv. Timirjazev. sel'sk. Akad., 1961, No. 1, pp. 22-41, bibl. 63, illus.

Results are given of experiments carried out in the Crimea and the Moscow region in 1951-1959 on the control of biennial bearing in apples. The best results were obtained from spraying during the on-years with DNOC or DNP at 0·06% applied 2–3 days after full bloom when 1–2 flowers in each cluster had been fertilized. During the years of spraying fruit size and quality and shoot and leaf growth were increased and flower bud initiation was greatly improved. In most cases the number of fruits harvested was not reduced, and as a result of greater fruit size the total yields were generally increased. In the off-years the treated trees always cropped more heavily than the controls.

5904. BÖMEKE, H.
Ein Beitrag zur chemischen Ausdünnung. **(A contribution to chemical thinning.)**
ErwObstb., 1961, **3**: 88-93, bibl. 13.

The practice of chemical thinning is reviewed, and results with German NAA preparations are discussed. In trials at Jork biennial bearing in the apple variety Altländer Pfannkuchenapfel was broken with 0·3% Shellstone or with 15 p.p.m. of the Na salt of NAA applied 1–2 weeks after flowering. Higher concentrations or later applications gave very poor results. With the variety Jakob Lebel 0·35% Shellstone gave the best result, reducing the yield to 80% of the controls and increasing the average fruit weight from 89·6 g. to 142 g. Geramid at 90 p.p.m. gave good results with Gravenstein and Cox, and also advanced ripening in the former by a week. Laxton's Superb, however, could not be thinned without serious leaf damage. In the pear variety Jeversche 0·225% Shellstone or 0·225% Geramid broke biennial bearing, and 0·15 or 0·2% Geramid applied during full bloom to Triomphe de Vienne improved fruit set and increased the yield per tree from 156 kg. to 227–277 kg.—Versuchsanst., Jork.

5905. Westwood, M. N., and Batjer, L. P.
Effects of environment and chemical additives on absorption of naphthaleneacetic acid by apple leaves.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 16-29, bibl. 24.

Foliar absorption of NAA without a surfactant was enhanced by the use of soft water, high humidity before or after spraying, pre-treatment with red light, or pre-treatment at 70° F. (as compared to 50°). The addition of Tween 20 tended to minimize the differences in NAA absorption resulting from different environmental conditions. These findings, together with the results of previous tests [see also *H.A.*, 29: 1144], lead to the conclusion that the addition of a suitable surfactant to NAA sprays enhances NAA uptake under conditions unfavourable for absorption, but may have little or no effect when conditions favour high absorption. The addition of a number of insecticides, urea or bentonite to NAA sprays partially or completely inhibited NAA uptake. A major portion of foliar absorption of NAA occurred after the sprays were dry, indicating that cutculari penetration occurred. Shoot growth following NAA sprays was inversely related to the amount of NAA absorbed. Low concentrations of Tween 20 were mildly stimulatory to NAA activity when the solutions were introduced to the leaves via the transpiration stream of cut shoots, which indicated a metabolic interaction between NAA and Tween 20. The individual effects of 19 different surfactants as spray additives were evaluated in comparison with standard sprays of NAA alone. No surfactant was more effective than Tween 20, but all other Tweens and Spray Modifier were as effective. The chemical nature of different surfactants is discussed relative to their possible action on components of plant cuticles. [From authors' summary.]—Agric, Res. Serv., U.S.D.A., and Wash. St. Univ., Wanatchee.

5906. Westwood, M. N., Batjer, L. P., and Billingsley, H. D.
Effects of environment and chemical additives on absorption of dinitro-o-cresol by apple leaves.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 30-40, bibl. 10, illus.

The absorption of DNOC sprays as measured indirectly by leaf injury was proportional to the duration of a high-humidity pre-treatment, but artificial rain following the sprays tended to minimize the effect of such humidity pre-treatment. A period of high humidity following DNOC sprays resulted in the same amount of injury as a similar period of wetting when no surfactant was added, but when V-77 or X-100 was added high humidity resulted in more injury than wetting. More leaf injury from DNOC resulted at 80° F. than at 60° F. when no surfactant was added, but when X-77 was added no difference was found. Different surfactants reduced the deposit of DNOC on leaves in varying degrees. The addition of a surfactant affected absorption of DNOC by mature leaves to a greater extent than by immature ones. A substantial amount of DNOC absorption occurred after the solutions were dry, indicating cuticular rather than stomatal entry. Some of the interrelationships of surfactants, deposit reduction, and environmental conditions with DNOC absorption are discussed. [From authors' summary. For earlier work see *H.A.*, 29: 1144.]—Agric. Res. Serv., U.S.D.A., and Wash. St. Univ., Wenatchee.

5907. Øhlers, H.
Lidt forskelligt om kemisk frugtudtynding. **(Notes on fruit thinning with chemicals.)**
Erhvervsfrugtavl., 1961, **27**: 236-40, illus.

The application of 50 p.p.m. Pomoxon (NAA) or 100 p.p.m. Acetamid (NAAM) to Victoria plum trees in full bloom did not affect fruit size. A 5% spray of lime-sulphur applied at the same time caused some temporary leaf damage, but the combined spray did increase the number of first-grade fruits, although this effect was best obtained by hand thinning. Recommendations are also given for the hormone thinning of apples and pears.

5908. Phillips, E. L.
Thinning peaches.
Circ. Va polytech. Inst. agric. Ext. Serv. **874**, 1961, pp. 3.

Directions for thinning by hand, pole and chemicals.

5909. Gaston, H. P., Hedden, S., and Levin, J. H.
Experiments in thinning peaches with machines. A progress report.
Quart. Bull. Mich. agric. Exp. Stat., 1961, **43**: 759-65, illus.

Tests were conducted to discover whether mechanical shakers used to harvest tree fruits could be used with advantage in thinning peaches. The size of fruit produced after machine thinning was satisfactory, but yields were reduced by about 13% owing to over-thinning on the tops of trees. With experienced operators, combined with supplementary hand thinning on the lower branches, the method should be economic.

Fruit development, composition and quality.

(*See also* 5786, 5807, 5859-5861, 5899, 5939-5941, 6223.)

5910. EGGERT, F. P.
The relation between heat unit accumulation and length of time required to mature McIntosh apples in Maine.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 98-105, bibl. 9.

A correlation coefficient of $-0{\cdot}959$ was found between the length of elapsed time (in days) from petal fall to harvest and the degree days (the daily mean temperature above a base temperature of 0° F.) accumulated at 40 days after petal fall. The regression line expressing this relationship is $\hat{Y} = 261{\cdot}64 - 0{\cdot}0563x$, where $\hat{Y}$ represents the predicted elapsed time (in days) from petal fall to optimum storage maturity and where x represents the degree days accumulated from petal fall to 40 days later. These highly significant relationships accounted for 92% of all variance in the time of McIntosh fruit maturity as measured by keeping quality in 32° F. storage. [From author's summary.]—Univ. Me, Orono.

5911. WILLING, H.
Phänologische und chemische Untersuchungen zur Fruchtentwicklung bei Kirschen. (**Phenological and chemical studies on cherry fruit development.**) [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1960, **8**: 561-94, bibl. 49.

In the seasons 1953–56 flowering of the sweet cherry varieties observed began not more than 3 days after Kassins Frühe, while the acid cherries began flowering up to 7 days later. The flowering period lasted for 12–16 days. The critical temperature sums for the start of flowering ranged from 3520° to 3660° C., based on the day temperatures above 3° C. from 1 March. The fruits grew in 3 stages, covering a total period of 46-70 days. Fruit colouring followed the third stage of fruit development, and a positive relationship was found between the time of onset and the duration of fruit colouring. The period from the end of fruit colouring to picking maturity may be up to 12 days according to variety and weather. Temperature sums were also determined for fruit colouring and maturation. The influence of rootstock on time of flowering, growth and maturity was slight. The chemical composition of fruits during growth and ripening was studied in 2 varieties, and some effect of rootstock was apparent. —Inst. Acker- u. PflB., Univ. Rostock.

5912. SÄKÖ, J.
Omenien putoamisen ehkäiseminen ruiskuttamalla. (**Apple fruit drop control by sprays.**)
Puutarha, 1961, **64**: 102-4.

Fruit drop of Kaneli, Wealthy and Atlas was satisfactorily controlled by 2,4,5-TP. Fruits of Åkerö were infected with *Fusarium*, and the spray did not affect the premature fruit drop caused by the infection. A spray of 2,4,5-TP was more satisfactory than one of 2,4,5-T for stopping fruit drop of Kaneli.

5913. GAYFORD, G. W.
Fruit drop can be prevented.
J. Agric. Vict., 1961, **59**: 51-2.

Pre-harvest drop on apples and pears controlled by spraying with NAA (10 p.p.m.) or 2,4,5-TP (15–20 p.p.m.).

5914. SAWADA, E., AND OTHERS.
The influence of 2,4,5-TP on the coloration, maturity and growth af apples and stone fruits.
[Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1960, **29**: 253-63, bibl. 25, illus.

Applications of 2,4,5-TP (20 p.p.m.) 1 month before harvest hastened the coloration and maturity of apples, increasing their sugar content without affecting their keeping quality, so that harvesting could be carried out 10–14 days earlier than that of untreated fruit. McIntosh apples required 40 p.p.m. Apple size was unaffected by treatment, but a distinct enlargement occurred in stone fruits and also in their stones. Maturity and coloration of stone fruits were accelerated and sugar contents were increased by the spray; a concentration of 40 p.p.m. is suitable for all stone fruits except peaches, for which 20 p.p.m. is recommended to avoid fruit damage.

5915. JACOBSEN, J. V.
Hormone sprays benefit apricots.
J. Dep. Agric. S. Aust., 1961, **64**: 451-2.

Triethanolamine salts of 2,4,5-T and 2,4,5-TP were applied to Moorpark apricots at very low rates 3 days after the beginning of stone hardening, the trees being sprayed to the drip stage. 2,4,5-TP advanced maturity by 5 days at 50 p.p.m. and by 9 days at 100 p.p.m., but 2,4,5-T was not effective. Yield results showed that 2,4,5-T at 25 p.p.m. gave the greatest increase of fresh fruit and also a good drying ratio. Yields from trees sprayed with 2,4,5-TP at 100 p.p.m. were the same as from the control trees. Where the triethanolamine form of hormone was used, trees suffered no ill effects, but serious damage was caused by applications of the butoxy ethanol ester form.

5916. Pólya, L.
A húsos termések érésének problémái. **(Some problems in the ripening of fleshy fruits.)**
Növénytermelés, 1961, **10**: 77-92, bibl. 108.
A review on the ripening of fruits and vegetables.

5917. Sitwell, A. P., and others.
Use of light transmittance techniques to estimate the chlorophyll content and stage of maturation of Elberta peaches.
Food Technol., 1961, **15**: 75-8, bibl. 15, from abstr. in *J. Sci. Food Agric.*, 1961, **12**: i-291.
Measurements made on peaches from successive harvests with 3 different light transmittance instruments are reported, and are compared with the chlorophyll content of the fruit.

5918. Simons, R. K.
Developmental changes in russet sports of Golden Delicious apples—morphological and anatomical comparison with normal fruit.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 41-51, bibl. 13, illus.
Macroscopic and anatomical descriptions are given of russet development on the fruit of 2 russet sports of Golden Delicious apple. Cuticle thickness was greater on normal Golden Delicious fruit than on the russet sports. The leaf contents of P, K, Ca and Na were lower in the sport trees during the time of russet development than in normal trees.—Univ. Ill., Urbana.

5919. Krapf, B.
Anatomische Untersuchungen der Apfelhaut. **(Anatomical studies on apple skin.)**
Schweiz. Z. Obst- u. Weinb., 1961, **70**: 333-40, bibl. 7, illus.
Lenticel formation, and its practical importance in storage behaviour.

5920. Bottomley, W., Goldacre, P. L., and Kefford, N. P.
A kinin from apple fruitlets—a progress report.
From abstr. in *Aust. J. Sci.*, 1960, **22**: 481.
The presence of a kinin which induces cell division in isolated tissue has been demonstrated in the receptacles of apple fruitlets. [For earlier work see *H.A.*, 30: 220.]

5921. Steckel, W.
Gedanken zum Qualitätstest bei Äpfeln. **(Thoughts on testing the quality of apples.)**
ErwObstb., 1961, **3**: 110-11, bibl. 7.
A discussion on some of the problems of quality evaluation and how to overcome them.

Harvesting, packing and marketing.

5922. Peregi, S.
Az almaszüret megszervezése az állami gazdaságokban. **(The organization of apple harvesting on state farms.)** [Russian and German summaries 2½ pp. each.]
Állami Gazd. üzemszerv. Kut. Int. Közlem. **12**, 1959, pp. 76, bibl. 39.
On state-owned apple farms in Hungary, with an average yield of 63 kg. per bearing tree, 15–16 man-hours were needed to produce 100 kg. apples in 1957. For picking 3–5 hours were required and for handling, including packing, 4–6 hours. These figures indicated efficiences of 50–60% and 15–20%, respectively, by international standards. Detailed methods are worked out for rationalizing apple harvesting, with special reference to grading, which should not be started until picking has finished.

5923. Hamer, P. S.
Apple handling from tree to storage box.
Grower, 1961, **55**: 1,221-3, illus.
In tests of 4 picking containers for apples bruising was least (9·3%) when a metal bucket with a flexible bottom (canvas apron) was used. Bruising was further reduced to about 7% when a container of the same design but made of fibreglass was used.—Kirdford Growers Ltd, Sussex.

5924. Duvekot, W. S., and Krijgsman, H. K.
Enige ervaringen met stapelkisten op Nederlandse fruitteeltbedrijven. **(Some experience with bulk handling in Dutch orchards.)**
Fruitteelt, 1961, **51**: 712-14, illus.
The results are given of one season's trial on the bulk handling of apples and pears. By using bulk bins as compared to orchard boxes the transport time during harvesting was reduced from 100 min./100 boxes to 67 min. for the equivalent of 100 boxes.—I.B.V.T., and I.T.T., Wageningen.

5925. Anon.
The new "Ansa" grader. Features of associate equipment.
Orchard. N.Z., 1961, **34**: 106-11, illus.
New designs for a sorting table, elevator, conveyor and packing stands. [For a description of the grader, see *H.A.* 31: 4022.]

5926. Breakiron, P. L., and Shaffer, P. F.
Shipping apples in pallet containers.
Agric. Mktg, 1961, (6)2: 11, illus.
Recommended pallet containers for apples hold from 500 to 2,000 lb. and measure 42 × 47 in. Height outside is 26 in. and inside 20 in. Returnable containers usually weigh 15% as much as the fruit they contain, whereas non-returnable containers weigh about 8%. Large pallet boxes are quicker to load and unload than conventional 40-lb. cartons and, because of the smaller pro-

portion of deadweight, qualify for lower transport charges.

5927. SOMMER, N. F., AND OTHERS.
Fresh fruit temperatures and transit injury.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 156-62, bibl. 7, illus.

Tests were made on the effect of transit vibrations on the fruit quality of 3 peach, 1 nectarine, 2 plum, 1 pear and 3 apricot varieties, and on the effect of fruit temperature on impact bruising of the same sorts of fruit. Results were suggestive rather than very definite in most cases, but respiration and weight loss were definitely increased in Winter Nelis pear by vibration injury, as was fungal invasion especially by *Rhizopus stolonifer* and *Penicillium expansum*. Warm fruits were found to be more susceptible to vibration injury, but less damaged by dropping, than similar cold fruits.—Univ. Calif., Davis.

5928. ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION.
Trial shipments for the European standardisation of table pears and citrus fruit.
Publ. EPA/OEEC **19**, 1959 Series (publ. 1960), pp. 65, 4s. 6d.

This publication, compiled from the reports of numerous Belgian, Swedish and Italian experts, contains detailed descriptions of projected standards for fruit quality and useful information on packing.

Storage.

(*See also* 5707, 5919, 7271, 7288.)

5929. GIROLAMI, L.
Magazzino per frutta refrigerato con aria notturna. **(A fruit store cooled by night air.)**
Progr. agric., Bologna, 1961, **7**: 757-60, illus.

Detailed constructional diagrams and costs of an air-cooled building for short-term storage of fruit.

5930. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.
Standaard bedrijfsschuur voor de fruitteelt. **(A standard shed for fruitgrowers.)**
Fruitteelt, 1961, **51**: 659-61, illus.

A design for a combined machinery store, packhouse and fruit store.

5931. DE FRUITTEELT.
I.B.V.T.—nummer. **(A number devoted to the Institute for Storage and Processing of Horticultural Produce [Wageningen].)**
Fruitteelt, 1961, **51**: 772-89, illus.

On the occasion of its 25th anniversary several articles are published on the Institute's work, including the following: Storage qualities of present-day apple and pear varieties, by J. B. v.d. Plasse; Gas-tight seals for doors and hatches, by H. v.d. Velden; The packing of processing strawberries, by G. van Belle; Some remarks on centralized fruit grading, by O. Wiersma; and Choosing pome fruit varieties for processing, by L. Gersons.

5932. KOPEC, K.
Některé poznatky o výdeji tepla uloženým ovocem a zeleninou a jejich využití v praxi. **(Some problems of heat evolution by stored fruits and vegetables and their practical importance.)** [Russian and German summaries ¼ p. each.]
Sborn. vys. Šk. zeměd. v Brně, Řada A, 1960, No. 2, pp. 213-21, bibl. 13.

The intensity of heat evolution by stored fruits and vegetables, which varies exponentially with storage temperature, was calculated for 12 fruits and 14 vegetables stored at temperatures ranging from 0 to 17° C. The average values obtained are presented as nomographs. Factors which influence the evolution of heat during storage, such as variety, stage of maturity and mechanical injury, should be allowed for in the calculations. On the basis of work carried out at the Institute for Fruit and Vegetable Technology an exponential equation was formulated relating the rate of heat evolution to the storage period. The practical application of these results is discussed.

5933. TOMCSÁNYI, P.
Gyümölcstárolási eljárások. **(Fruit storage methods.)**
Mezőgazdasági Világirodalom, 1960, **2**(3): 96-107, bibl. 40.

For apples, pears and stone- and soft-fruits.

5934. NOOIJ, S. H.
Luchtwassen in fruitbewaarplaatsen. **(Air washers in fruit stores.)**
Fruitteelt, 1961, **51**: 656-8.

In one year's trial apples in a cool store with an air washer were satisfactorily stored for 4–6 weeks longer than those cool-stored without air purification. The higher R.H. in the washed-air store did not increase the development of fungal rots, and the fruit was better coloured after storage.—R.T.C., Hoorn.

5935. ULRICH, M.
Les diverses variétés fruitières et leur conservation. **(Different fruit varieties and their storage.)**
Arboric. fruit., 1960, **7**(82): 6-7.

Golden Delicious apples were stored most successfully at 4–7° C. with an R.H. of 85%, but fruit stored in polythene bags at 12–14° C. also remained in excellent condition for 5 months; the atmosphere inside the bags stabilized at 3% O_2 and 5% CO_2. Reinette blanche du Canada should be harvested late and stored at an R.H. of 85% at 4° C. in a controlled atmosphere containing 2% O_2 and 5% CO_2. Early harvesting of Stayman Winesap is recommended, with storage at an R.H. of 85% at 0° C. Williams' pears should be harvested when green and stored after pre-cooling at 0° C., R.H. 85–90%, in a controlled atmosphere containing 2% O_2 and 4% CO_2. Passe-Crassane and Doyenné du Comice pears should be stored green at 0° C. and ripened at 15° C. at the end of the storage period. A number of varieties which do not keep well in cold storage are listed.—Lab. Biol. du Froid, C.N.R.S.

5936. ULRICH, R.
Température et maturation. Le cas des poires nécessitant un traitement préalable par le froid. (**Temperature and ripening. An example of pears needing pre-cooling treatment.**) [English, German, Russian and Spanish summaries approx. 11 lines each.]
Fruits d'Outre Mer, 1961, **16**: 3-8.

Pears of the variety Passe Crassane need a temperature of 4–5° C. for normal ripening. If they are stored at 0° C., however, they can then be ripened at 15–18° C. The respiratory and other metabolic changes occurring at 0, 4 and 18° C. are described. —Lab. Biol. du Froid, C.N.R.S.

5937. PRATELLA, G. C.
La maturazione accelerata della frutta. (**The accelerated ripening of fruit.**)
Frutticoltura, 1961, **23**: 227-33, illus.

The Italian Ministry of Industry and Commerce prohibits the artificial ripening of fruit, but allows the acceleration of natural ripening (chiefly the development of colour) in fruits already physiologically mature. The biochemical effects of ethylene treatment on pears are described, with special reference to the variety Passe Crassane. Brief mention is made of the use of ripe persimmons and of *Penicillium*-affected citrus fruits to accelerate ripening of their own species by the emission of ethylene, and details are given of automatic application of the gas, with control of the oxygen and CO_2 percentages in the atmosphere.—Ist. Pat. veg., Univ. Bologna.

5938. PHILLIPS, W. R., MACQUEEN, K. F., AND POAPST, P. A.
The effect of irradiation on the development of storage disorders of apples. [French summary ½ p.]
Reprint from *Proc. 10th int. Congr. Refrig., Copenhagen, 1959*, 1960, **3**: 176-80, bibl. 8, illus.

Another account of work already abstracted in *H.A.*, 30: 1776 and 31: 2070.

5939. BÜNEMANN, O.
Der Stickstoffgehalt im Gewebe stippiger Äpfel. (**The nitrogen content of apples affected with bitter pit.**)
Z. PflErnähr. Düng., 1960, **89**: 188-90, bibl. 3.

The dried fruit tissue of Northern Spy apples affected with bitter pit had a N content twice as high as that of apples free from bitter pit.

5940. TOMANA, T.
Histological and physiological studies on the cause of Jonathan spot in apples. I. Varietal difference in skin structure of fruit in relation to spot development. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1960, **29**: 273-80, bibl. 26, illus.

Cuticle formation on the skin was much slower in the most susceptible variety Jonathan than in the moderately resistant McIntosh or in the resistant varieties Ralls and Indo. In all varieties as the fruit grew, the stomata cracked and finally developed into lenticels. The process was very slow in Jonathan, and treatment with Sudan III solution, methylene blue solution and formalin gas showed that, in Jonathan skin, some of the lenticels allowed the dye to infiltrate into the inner tissue, whereas those in Ralls and Indo skins did not. Lenticels in the centre of Jonathan spots had poorly developed cork cambium, or else the stomata or skin surrounding it were at an early stage of cracking. In stored Jonathan apples spots developed only on fruits in which dye infiltration had taken place. The spots developed more rapidly in a moist atmosphere than in a dry one, and at 20° C. ± 5° C. than at 0° C. or 35° C.

5941. SHUTAK, V. G., AND CHRISTOPHER, E. P.
Role of apple cuticle in development of storage scald on Cortland apples.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 106-11, bibl. 8, illus.

It appears that cuticle plays an important role in the development of scald. Cuticle appears to act as a barrier, decreasing the escape of the causal substance(s) responsible for scald [see also *H.A.*, 24: 199]. In addition, cuticle may enter into the scald-forming process and may be called a "participant" in scald formation. Just how cuticle could participate is not known, but the evidence suggests that it either forms, contains, absorbs or adsorbs a substance or substances necessary for scald production. [Authors' conclusions.]—R.I. agric. Exp. Stat., Kingston.

5942. DENMEAD, C. F., VERE-JONES, N. W., AND ATKINSON, J. D.
A commercial method of controlling apple scald with diphenylamine emulsions.
J. hort. Sci., 1961, **36**: 73-84, bibl. 8, illus.

Apples loose-packed in bushel boxes were successfully protected from superficial scald by drenching with a 0·2% w./v. emulsion of diphenylamine (DPA). Protection from scald injury and uptake of DPA both increased with longer treatment. Uptake of DPA was found to vary greatly between different varieties and appeared to be negatively correlated with scald susceptibility. Scald protection was positively correlated with the initial concentration of DPA on the apple's surface.—D.S.I.R., New Zealand.

5943. Ceponis, M. J., and Friedman, B. A.
Water core in Lady variety apples during storage.
Plant Dis. Reptr, 1960, **44**: 29-30, bibl. 2.

During storage at 35° F. for up to 4 months, and the subsequent holding period of 7 days at 70° F., the percentage of water core in Lady apples was progressively reduced. Internal breakdown increased during cold storage, and was more severe in apples that had shown visible water core before storage. No internal breakdown was found in apples unaffected by water core until the 5-month storage inspection. The incidence of decay in water-core-affected apples after storage was 5%, and in unaffected apples it was 3·8%.—Agric. Mktg Serv., U.S.D.A., New York.

5944. Pierson, C. F.
Postharvest fungicide treatments for reduction of decay in Anjou pears.
Plant Dis. Reptr, 1960, **44**: 64-5, bibl. 3.

Captan, Phaltan and Stop-Mold (sodium-o-phenylphenate) were about equally effective as postharvest dips for control of decay. Dehydroacetic acid was less effective.—Agric. Mktg Serv., U.S.D.A., Wenatchee, Wash.

5945. Luvisi, D. A., and Sommer, N. F.
Polyethylene liners and fungicides for peaches and nectarines.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 146-55, bibl. 18.

Polythene bags should be sufficiently vented to prevent harmful levels of CO_2 accumulating in peach and nectarine containers; in such cases the density of the polythene becomes unimportant. When atmospheres were kept satisfactory, ripening was only slightly retarded. CO_2 levels tolerable to nectarines and peaches slowed the rate of decay only slightly. Hence the justification of the use of polythene film would appear to be in its control of shrivelling during storage and transit. Under the higher humidity conditions within polythene liners, both dehydroacetic acid and sodium orthophenylphenate dips controlled the postharvest infections due to *Monilinia* [*Sclerotinia*] *fructicola* and *Rhizopus stolonifer*.—Univ. Calif., Davis.

5946. Ogawa, J. M., and Lyda, S. D.
Effect of alcohols on spores of *Sclerotinia fructicola* and other peach fruit-rotting fungi in California.
Phytopathology, 1960, **50**: 790-2, bibl. 12.

Propanol, isopropanol, ethanol and methanol were tested on *S. fructicola*, *Rhizopus stolonifer* and *Gilbertella persicaria*, with a view to their use as post-harvest dips for the control of fruit rots on peaches. In general, the effectiveness of the alcohols increased with their molecular weight. Conidia of *Sclerotinia* were killed at lower concentrations of alcohol than those of the other species. A 1-min. dip in 60% ethanol did not damage the fruit if it was immediately rinsed in water. This treatment produced firmer fruits with a more intense colour.—Univ. Calif., Davis.

Processing and by-products.

(*See also* 5803, 5931.)

5947. Wiley, R. C., and Toldby, V.
Factors affecting the quality of canned apple sauce.
Proc, Amer. Soc. hort. Sci., 1960, **76**: 112-23, bibl. 8.

The effects of variety, time of harvesting and storage conditions were investigated.

5948. Aref, M., and Soliman, F.
Possible utilization of fruits' waste material in the United Arab Republic.
Alexandria J. agric. Res., 1960, **8**: 173-81, bibl. 11, illus., from *Trop. Abstr.*, 1961, **16**, Abstr. i642.

Apricot kernel oil comprised over 1% of the fresh fruit weight and was extracted from the pits of processed apricots. The press cake provides a stock feed.

5949. Jankov, S. I.
Comparative studies on the amino acid composition of certain stone fruit kernels.
[Russian, with French summary 8 lines.]
C.R. Acad. bulg. Sci., 1961, **14**: 251-4, bibl. 5, illus.

After the essential oils and edible fats have been extracted from the kernels of apricot, peach and plum stones, the residues can be used for cattle fodder. Data are presented on the amino acid contents of these residues, obtained by chromatographic analysis.

SMALL FRUITS, VINES AND NUTS.

Strawberries.

(*See also* 5717, 5837, 5931, 5933, 5972, 6102, 6123, 6245, 6248, 6668, 6672, 7254, 7258, 7263, 7264, 7269, 7270, 7277.)

5950. STEYN, P. A. L.
Strawberries in South Africa.
Bull. Dep. agric. tech. Serv., Union S. Afr., **372**, 1960, pp. 26, illus.

All aspects of strawberry growing are discussed, including the selection of new high yielding varieties adapted to South African conditions, notably from Bien Donné No. 1 × Missionary and Bien Donné No. 1 × Massey.—West. Prov. Fruit. Res. Stat., Stellenbosch.

5951. CARNE, I. C.
Observations on strawberry varieties as grown in the Fraser Valley.
Strawberry growing with particular application to the Fraser Valley.
Hort. Circs Dep. Agric. Victoria, B.C., **87** and **88**, 1961, each 1 folded sheet.

Notes on 6 varieties, and cultural advice to growers.

5952. REINHERCS, A.
Polnische Erdbeeren—ein wertvoller Rohstoff für die industrielle Obstverwertung. **(Polish strawberries—a valuable raw material for the fruit preserving industry.)**
Industr. Obst- u. Gemüseverwertung, 1960, **45**: 280-2, from abstr. in *Beerenobstschrift.*, 1960, No. 20, p. 8.

About 5,000 ha. giving an average yield of 30,000 tons are cultivated at present. The chief variety for export is Murzynka (Negress), a Polish selection of the American variety Africa. It is disease-resistant and does not suffer from virus attack. It is the best of all European varieties for processing and has a much higher vitamin C content than German, Russian and American varieties.

5953. VAN DEN BRANDE, K.
Ervaringen met aardbeirassen op zandgrond. **(Variety trials with strawberries on sandy soil.)**
Ons Fruitteeltblad, 1961, **5**: 18-20.

In a trial with a one-year culture of strawberries on a sandy soil in Belgium the best yields were obtained from Redgauntlet, a seedling (Z.-B.V.A. 67) and Merton Princess. Irrigation of early varieties during flowering did not affect yields.

5954. OBERLE, G. D., WINGARD, S. A., AND HARDIGREE, J. B.
Varietal responses in strawberries to winter injury.
Fruit Var. hort. Dig., 1961, **15**: 55-7.

Marked differences in production between varieties were attributed to root injury, resulting from sudden low temperatures in the autumn. In general, reductions in yields were related to the degree of damage. A table shows the degree of root injury, plant stand, vigour and yield of 21 varieties.—Va agric. Exp. Stat., Blacksburg.

5955. SCOTT, D. H., AND HAUT, I. C.
Midway, a new red stele resistant strawberry variety.
Fruit Var. hort. Dig., 1961, **15**: 45-6.

A mid- to late-season variety, originating from a Dixieland × Temple cross.

5956. PESSERL, G., AND SCHIMMELPFENG, H.
Erdbeervermehrung mit Hilfe von Sprühnebel im Freiland. **(Strawberry propagation under mist in the open.)**
ErwObstb., 1961, **3**: 112-13, illus.

A mist system was arranged to spray 1-year-old mother plants for 10–15 minutes, 2 or 3 times per day. Runner plants raised under these conditions were much stronger than those propagated without misting.

5957. NELSON, S. H., AND HUNTER, A. W. S.
Storage of strawberry plants.
Progr. Rep. Hort. Div., centr. exp. Fm, Ottawa, 1954-58, 1960, pp. 28-9.

Strawberry plants were successfully stored in bunches or loosely packed in polythene bags at 30–32° F. Storage at 28° and 35° F. was less satisfactory. It was possible to remove the plants from storage for cleaning and return them to the store without reducing the rate of survival.

5958. (WEGMAN, T.)
Aardbeienteelt op stellingen. **(Strawberry growing on racks.)**
Meded. Dir. Tuinb., 1961, **24**: 220-1, illus.

By using racks the surface area of boxed strawberries which can be grown in a square meter is increased 4 times. Two types of rack are illustrated, one with a triangular frame and the other upright.

5959. RAUDENKOLB, J.
Erdbeertreiberei im Grossraumhaus in Kisten. **(Strawberry forcing in boxes in glasshouses.)**
ErwObstb., 1961, **3**: 113-15, bibl. 1, illus.

The cultural methods used for producing strawberries in April and May are described. The plants are given extra lighting to encourage extension growth of flower stalks, and in the second year of production yields of 1·5–2 kg./sq. m. can be expected.

5960. MOMMERS, J.
De bestuiving van aardbeien onder glas. **(The pollination of strawberries under glass.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1961, **24**: 353-5, 385, illus.

In 3 out of 4 holdings yields of early strawberries in glasshouses were improved in weight and quality when bee colonies were placed among the crop.

5961. THOMPSON, P. A.
Evidence for a factor which prevents the development of parthenocarpic fruits in the strawberry.
J. exp. Bot., 1961, **12**: 199-206, bibl. 4, illus.

Observations of fruit development in the cultivated strawberry are interpreted as showing that, in unpollinated fruits, development of fruit tissues ceases at anthesis because of an inhibitory factor produced by the maturing carpels. It is suggested that one of the functions of pollination, or fertilization, is to remove this inhibition and make the tissues susceptible to stimulation by growth substances produced either by the parent plant or the fertilized carpels. Receptacles in which pollination is confined to a single carpel swell only around the point of insertion of that carpel, and no swelling occurs beneath neighbouring unfertilized carpels. Likewise, after treatment of the plant with GA swelling of fruit tissue occurred only at the base and did not extend into areas occupied by unfertilized carpels. Parthenocarpic fruits were produced in two ways; both depended on the suppression of carpel development on the receptacle. In one case modification of the plants' environment resulted in the production of leafy bracts in place of carpels. In the other, carpel development was specifically inhibited by applications of MH at the time of carpel formation. When carpels were only partially suppressed swelling occurred only in areas either free of carpels or occupied by fertilized carpels, never in areas occupied by unfertilized carpels. [Author's summary.]—Scot. hort. Res. Inst., Mylnefield, Invergowrie.

5962. GUTTRIDGE, C. G., AND OTHERS.
Post-harvest defoliation of strawberry plantations.
J. hort. Sci., 1961, **36**: 93-101, bibl. 5.
GUTTRIDGE, C. G., AND WOOD, C. A.
Defoliation of strawberry plants.
Scot. Agric., 1961, **41**: 39-42, bibl. 3, illus.

Fruit yields of Talisman and Redgauntlet in Scotland were increased, sometimes substantially, by defoliation in August. Increases in yield were greatest in years when the untreated controls had very low yields. Defoliation resulted in the formation of flower trusses in a larger proportion of the crowns. It is thought that defoliation increases truss induction by removing the source of a vegetative-growth-promoting, flower-inhibiting hormone.—Scot. hort. Res. Inst., Mylnefield, Invergowrie.

5963. FORTIER, F.
L'irrigation des fraisières dans le Québec, Canada. **(The irrigation of strawberry crops in Quebec.)**
Rev. d'Oka, 1961, **35**: 1-12.

The subject is discussed under the headings: water in the strawberry plant and the soil, rainfall (not sufficient during the production season), the advantages of irrigation (yields increased by 50–75%, prolonged harvesting period, improved quality, runner production and cold-storage properties, and prevention of frost damage), methods of irrigation (surface, sub-surface and overhead), a comparison of surface and overhead irrigation (the latter being preferred), costs of overhead irrigation.

5964. SIMONS, R. K.
The influence of irrigation upon growth and yield of strawberries.
Trans. Ill. St. Acad. Sci., 1961, **53**: 93-100, from *Biol. Abstr., Sect. D*, 1961, **36**, Abstr. 42,481.

The effects of various soil moisture levels on the yield and quality of Howard 17 (Premier) and Vermilion strawberries were studied for 4 seasons. Both varieties produced significantly higher yields when irrigated, particularly when supplemental moisture was applied during the critical periods of fruit bud formation. Irrigated plots produced larger berries.—Univ. Ill., Urbana.

5965. WAGGONER, P. E., MILLER, P. M., AND DE ROO, H. C.
Plastic mulching: principles and benefits.
Bull. Conn. agric. Exp. Stat. **634**, 1960, pp. 44, bibl. 19, illus.

The effects of different types of mulching material (organic, aluminium, paper and plastic) in modifying the soil climate beneath them were studied in detail. In a strawberry plot on a fine sandy loam nitrate contents during the growing season were consistently higher under mulches than in bare soil. Strawberries mulched with natural or green translucent plastic film flowered and fruited earlier and produced more runners than plants mulched with other materials or left unmulched. The roots of mulched plants were more liable to attack by *Rhizoctonia solani* than those of plants in bare soil. A plastic mulch did not discourage deep rooting of a shade variety of tobacco, and mulched plants were taller than those grown in bare soil. After curing the mulched plants had a higher frequency of light brown and mottled leaves than had plants grown in bare soil. The effects of mulching on shade tobacco were not always the same as those produced by shading.

5966. Locascio, S. J., and Thompson, B. D.

Strawberry yield and the soil nutrient levels as affected by fertilizer rate, type of mulch and time of application.

Proc. Fla St. hort. Soc., 1960, 1961, **73**: 172-9, bibl. 6.

The early and total yields of strawberries were significantly greater from plastic-mulched plots than from plots mulched with paper or pine straw or not mulched at all. Plastic mulch applied at planting time with all of the fertilizer was superior to that applied one month later with a split fertilizer application. Plots mulched with paper or pine straw yielded more fruit when mulched one month after planting with a split fertilizer application. Yield increased linearly with rate of fertilizer application up to 2,000 lb. per acre of 6–8–6 fertilizer. The average soil K level was higher under plastic mulch than under pine straw mulch. Also, the level tended to be higher under plastic than under paper or in non-mulched plots. The soil K_2O level increased cubically with increased fertilizer rates. The soil P level increased linearly with increased fertilizer rates. Type of mulch or time of application had no effect on P level. The moisture level of the soil was higher under plastic and pine straw mulches than under paper or in non-mulched plots. [From authors' summary.]—Fla agric. Exp. Stat., Gainesville.

5967. Luckan, J.

Ergebnisse von Termindüngungsversuchen zu Erdbeeren. (**The results of manuring strawberries by instalments.**)

ErwObstb., 1961, **3**: 115.

The highest total yields over 4 years were obtained from Senga Sengana when a complete fertilizer (10:8:18) was applied 3 times, with 4 kg./are in March, 2 kg./are in May and 2 kg./are in July. The differences, however, between a single heavy application and various split applications were small. Earlier trials with Georg Soltwedel showed that the highest average yields were obtained from plants given N fertilizers in 3 instalments, as ¼ in March, ¼ in May and ½ in August, totalling 7·8 kg./are.

5968. Ballinger, W. E., and Mason, D. D.

Selection of a tissue for use in strawberry nutritional studies.

Proc. Amer. Soc. hort. Sci., 1960, **76**: 359-65, bibl. 17.

Studies on the Albritton strawberry variety showed that the leaflets were the best single plant part for indicating the status in the plant of all the elements N, Ca, P, K and Mg, though actually the crown was the best indicator for P, the petiole for K and the roots for Mg.—N.C. St. Coll., Raleigh.

5969. Lanning, F. C.

Nature and distribution of silica in strawberry plants.

Proc. Amer. Soc. hort. Sci., 1960, **76**: 349-58, bibl. 19, illus.

Silica was determined by various specified methods and was found to occur in all parts of 3 wild species of *Fragaria* and in 8 different varieties of cultivated strawberry. The details of the experimental results are given here.—Kans. St. Univ., Manhattan.

5970. Janick, J.

The measurement of fruit size in strawberry.

Proc. Amer. Soc. hort. Sci., 1960, **76**: 343-8, bibl. 2, illus.

The most precise method for predicting the number of strawberries per quart was shown to be average berry weight in the Earlidawn and Pocahontas varieties. [See also *H.A.*, 31: 4050.]

5971. Moore, R. C., and Oberle, G. D.

Strawberry mold stopper.

Amer. Fruit Gr, 1961, **81**(5): 20-1, illus.

A commercial formulation of dehydroacetate (Harven), applied as a dip to strawberry fruits before storage at room temperature, delayed mould development for 3–4 days, whereas untreated fruits became mouldy by the second day in room temperature. The Harven dip increased storage life to 15–16 days in a cold store as compared to 8 days for untreated berries.—Va agric. Exp. Stat., Blacksburg.

Other small fruits.

(*See also* 5655, 5796, 5837, 5847, 5933, 6248, 7258, 7264, 7269.)

5972. Šajkin, V. G.

Soft fruit culture in the Siberian forest region. [Russian.]

Sadovodstvo, 1961, No. 2, pp. 21-2, illus.

Trials to compare the cropping capacity of 3 raspberry, 5 black currant and 2 strawberry varieties are described. Wild currant bushes gave higher yields than cultivated varieties and after 5–6 years of growth the plants were stronger. They also propagated easily, giving plants of good economic quality. The strawberry variety Koralka and a local garden strawberry withstood temperatures of —50° C. and lower under snow cover without damage.

5973. Wierzchowski, Z., and Bubicz, M.

Karotenoidy owoców berberysu zwyczajnego. (**Carotenoids in the fruits of *Berberis vulgaris*.**) [English and Russian summaries ¾ p. each.]

Ann. Univ. M. Curie-Skłodoswka, Sect. C, 1959 (issued 1961), **14**: 383-405, bibl. 14, illus.

Chromatographic separation of the carotenoid pigments in ripe berries showed that xanthophylls comprise almost 95% of the total carotenoids. The xanthophyll content was 15·1 mg./g. of the fresh weight of the flesh, whereas the carotene content was only 1·1 mg./g. Lutein was the major component of the xanthophyll fraction, followed by flavoxanthin.

5974. SIMPSON, H. A.
Commercial production of Flordagrand blackberries.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 337-8.

A brief note on the growing and economics of this variety in Florida.

5975. NASR, T. A. A., AND WAREING, P. F.
Studies on flower initiation in black currant. I. Some internal factors affecting flowering.
J. hort. Sci., 1961, **36**: 1-10, bibl. 4, illus.

The inter-relations between extension growth, bud development, bud dormancy and flower initiation were studied in the Victoria black currant variety, in which extension growth ceases in late July or early August, and flowers are initiated during the third and fourth weeks of August. Shoot decapitation early in the growing season caused the lateral buds to grow out, but later the buds became partially dormant and did not respond to decapitation. This dormancy was first manifested by the basal buds of a shoot, and progressed to the distal buds later in the season. After extension growth stopped the meristem in the upper buds was transformed from the vegetative to a reproductive condition. The internal conditions necessary for flower initiation appear to be the release of lateral buds from correlative inhibition and a state of partial dormancy in the buds.—Univ. Manchester.

5976. NASR, T. A. A., AND WAREING, P. F.
Studies on flower initiation on black currant. II. Photoperiodic induction of flowering.
J. hort. Sci., 1961, **36**: 11-17, bibl. 6, illus.

In actively growing Baldwin black currants transference from long-day to short-day conditions caused the initiation of flowers in the lateral buds. Flowers were not initiated in plants maintained in long-day conditions. In intact plants flowers were initiated in response to 16 short days, whereas in decapitated plants the inductive period was 8 days. The presence of mature leaves was shown to be necessary for a flowering response to short-day conditions.—Univ. Manchester.

5977. (ATKINS, P. S.)
Straw-mulched black currants need no increase in nitrogen.
Comm. Gr, 1961, No. 3414, p. 1327.

A straw mulch improved the growth of Mendip black currants, particularly in the early years, irrespective of N level on a light soil. Mulched bushes showed a 20% increase in yield in the first crop, but in the second cropping year the flowers were badly frosted. Straw mulching also promoted growth of young apples and pears, as measured by tree girth and weight of prunings.—Fisons Ltd., Levington Res. Stat., Felixstowe.

5978. NEUMANN, U.
Steigerung der Flächen- und Arbeitsproduktivität durch Schnitt und Standweite bei der Schwarzen Johannisbeere. **(Increasing the yield per unit area of black-currants and labour productivity through pruning and spacing.)**
Neue dtsch. Obstb., 1960, **6**: 167, from abstr. in *Beerenobstschrift.*, 1960, No. 20, p. 19.

A method of training is described which exploits the fact that fruit is borne mainly on 1-year-old wood. The bush is kept at a height of about 50 cm. and a diameter of 1 m. It is pruned to give a lower vegetative tier of 2-4-year-old shoots about 30 cm. in length surmounted by a fruiting tier of 1-year-old shoots 25 cm. in length. The shoots of the 1-year-old bush in the nursery are cut back to about 15 cm. in length to leave 3 buds on each. These buds produce 3 new shoots; the upper 2 are cut back after the 2nd season to a length of 25 cm., whereas the lowest is cut to leave only 2 buds. In the 3rd season the upper 2 shoots fruit, whereas the lower grows new shoots. After the 3rd season the shoots which bore fruit are removed, and the lower ones are cut back to 25 cm. to fruit in the 4th year. After the 4th year the branch is cut right back and replaced by a shoot growing up from the base. Four replacement branches are allowed to grow each year, and the number of principal branches is kept constant at 12–16. The bushes should be planted deeply so that only 1-year-old shoots remain visible. A spacing of 2·50 × 1 m. is recommended.

5979. JANICKI, J., DUDA, Z., AND GOGOLEWSKI, M.
Oznaczenie witaminy E w niektórych krajowych produktach zbożowych i nasionach. **(Determination of vitamin E in some Polish cereal products and seeds.)**
Przem. Spoż., 1958, No. 10-12, pp. 415-17, from *Polish. tech. Abstr.*, 1959, No. 34, Abstr. 5974.

The tocopherol content of black currant seeds was 266·7 mg.% and that of tomato seeds 285·0–305·9 mg.%. Red currant seeds were an inferior source of tocopherol.

5980. BLASBERG, C. H.
Growing blueberries in Vermont.
Pamphl. Vt agric. Exp. Stat. **19**, revised 1961, pp. 3.

5981. HALL, I. V., AND AALDERS, L. E.
Cytotaxonomy of lowbush blueberries in eastern Canada.
Amer. J. Bot., 1961, **48**: 199-201, bibl. 4.

Mainly *Vaccinium angustifolium* and *V. boreale*.

5982. (Darrow, G. M., and Brightwell, W. T.)

Woodard is for the deep South.

Agric. Res., Wash., 1961, **9**(9): 15-16.

Woodard is a rabbit-eye type of blueberry which requires only a short rest period in winter. It requires pollination by another rabbit-eye variety (Tifblue is recommended), and produces large, early-ripening, slightly acid berries which travel well and do not crack in rainy weather.

5983. Eaton, E. L., and White, R. G.

The relation between burning dates and the development of sprouts and flower buds in the lowbush blueberry.

Proc. Amer. Soc. hort. Sci., 1960, **76**: 338-42, bibl. 3.

Lowbush blueberries were pruned by fire at different times throughout the season. The number of sprouts, length of sprouts, the total number of flower buds, number of flower buds per sprout and proportion of sprouts carrying flower buds were greater when burning was done in early spring. This was followed by a consistent drop in all measurements taken on plots burned at a later date. No new sprouts emerged during the burning year on plots burned after 1 July. Sprouts which appeared on these plots the next spring were similar to those following spring burning. [Authors' summary.]—Res. Stats, Kentville, N.S., and Fredericton, N.B.

5984. Woodbridge, C. G., and Drew, R. H.

A boron deficiency dieback in highbush blueberry.

Plant Dis. Reptr, 1960, **44**: 855-7, bibl. 5, illus.

A high correlation was found between the low B content of the plants and the incidence of a dieback which occurred in Western Washington in 1958, mainly on the varieties Pioneer and Pemberton. As the soil B content appeared to be adequate, the dieback is considered to be the result of the low soil moisture content which rendered the plants unable to utilize the B.—Wash. St. Univ., Pullman.

5985. Suomalainen, H., and Keränen, A. J. A.

The first anthocyanins appearing during the ripening of blueberries.

Nature, 1961, **191**: 498-9, bibl. 6.

The analytical procedure is described in detail. The first to appear were cyanidin-3-glucoside and an arabinose-containing cyanidin derivative, possibly cyanidin arabinoglucoside. These are also the most abundant pigments of the ripe blueberry.—State Alcohol Monopoly, Helsinki.

5986. Friedrich, H.

Über das Vorkommen von Pyrosid in den Blättern der Preisselbeere (*Vaccinium vitis-idaea* L.). **(On the presence of pyroside in the leaves of cranberry (*Vaccinium vitis-idaea* L.).)**

Naturwissenschaften, 1961, **48**: 304, bibl. 8.

Pyroside, an acetic acid ester of arbutin [see *H.A.*, 31: 3949), was identified in the leaves of cranberry. Neither pyroside nor arbutin could be detected in the leaves of blueberry (*Vaccinium myrtilis*).—Inst. KulturpflForsch., Gatersleben, Berlin.

5987. U.S. Department of Agriculture, Agricultural Research Service.

Growing raspberries.

Fmrs' Bull. U.S. Dep. Agric. **2165**, 1961, pp. 16, illus.

Including brief descriptions of the main varieties grown in the U.S.A.

5988. Turner, D. H.

A better raspberry crop.

Agriculture, Lond., 1961, **68**: 13-17.

Promise and Exploit, which until recently comprised a large proportion of the acreage and were marketed as pulp for jam manufacture, are being replaced on smaller farms by double-purpose varieties suitable for canning, quick freezing or fresh fruit sales. The most popular of these is Jewel. Ripening and fungal rotting can be delayed by cooling and storage in 20% CO_2. Sprays of DDT or malathion are recommended for the control of raspberry beetle, and captan or thiram sprays to reduce the incidence of grey mould.—Edinb. E. Scot. Coll. Agric.

5989. Haskell, G.

The raspberry wild in Britain.

Reprint from *Watsonia*, 1960, **4**: 238-55, bibl. 18, illus.

A genetical study of the progeny of wild raspberry seeds from 30 European sources, in which a comparison of wild and cultivated raspberries throws doubt on the wild ancestry of Lloyd George.

5990. Jennings, D. L.

Mutation for larger fruit in the raspberry.

Nature, 1961, **191**: 302-3, bibl. 1, illus.

The genetics of a large-fruited mutant of Malling Jewel and a small-fruited mutant of Malling Promise, found in Scotland, are being examined.—Scot. hort. Res. Inst., Mylnefield, Invergowrie.

5991. Potter, J. M. S.

Notes on a preliminary raspberry trial 1955-59.

Exp. Hort., 1961, No. 4, pp. 73-4, bibl. 1.

Two unnamed East Malling raspberry seedlings 69/139 and 55/6, gave satisfactory performance in a preliminary trial.—Nat. Fruit Trials, Brogdale.

5992. Hull, J. W.

Commercial red raspberries in Arkansas?

Arkans. Fm Res., 1961, **10**(1): 10, illus.

Varieties for Arkansas have been developed, which incorporate resistance to heat, drought, winter killing and *Septoria* leaf spot. The new varieties which are polyploid derivatives of *Rubus parvifolius* range from semi-trailing to fully erect types, bea large, firm, attractive fruits and do not disintegrate when canned.

5993. Bennett, E., and Weeks, W. D.
A partial chemical analysis of two varieties of raspberry canes which differ in winter hardiness.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 366-9, bibl. 8.

The percentage content of soluble sugars, total nitrogen, pectic compounds, ether extract and moisture determined indicated little or no relationship to winter hardiness in the two varieties examined.—Mass. agric. Exp. Stat., Amherst.

5994. Hill, R. G., Jr.
Red raspberry growth and yield as affected by soil management, nitrogen fertilization, training systems.
Res. Bull. Ohio agric. Exp. Stat. **857**, 1960, pp. 31, bibl. 14.

Four replicate blocks of the variety Latham were established in the spring of 1949 on a well drained silt loam, and the growth and yield of the blocks were studied during the 1951–1954 seasons. The effects of the various cultural practices were independent of each other. Mulching was superior to soil cultivation, as mulched plants produced better growth and yields and had larger berries. Moderate pruning of dormant canes did not markedly affect the yield, but fruit from canes pruned to 36 in. was larger than fruit from canes pruned to 54 in. Trellising did not increase yields, but did help in preventing crop loss due to wind and rain damage. The actual rate of N fertilization was not as important as the maintenance of the proper level of N within the plant. The best indication of the N status of the crop was the foliar N level, and for the best growth and yield the foliar N content of non-bearing shoots in midsummer appeared to be within the range 2·9 to 3·2% on a dry-weight basis. Leaf colour was directly related to the foliar N content.

Vines—general.

(*See also* 5781.)

5995. Vega, J.
Aspectos de la viticultura del Perú. **(Aspects of viticulture in Peru.)**
Idia, 1961, No. 157, pp. 1-8, bibl. 2, illus.

Varieties, pruning, training and other cultural practices in various regions.

5996. Vryonides, P.
Notes on the vine industry in Cyprus.
Countryman, Nicosia, 1961, Jan./Feb., pp. 8-10.

History, types of wine produced, production and export figures.

5997. U.S. Department of Agriculture, Agricultural Research Service.
Muscadine grapes, a fruit for the south.
Fmrs' Bull. U.S. Dep. Agric. **2157**, 1961, pp. 16, illus.

Propagation, planting, pruning and training, soil management, nutrition, harvesting, diseases and pests, and fruit characteristics of 15 varieties.

5998. Baudel, J.
La localisation des vignobles. **(The localization of vineyards.)**
Progr. agric. vitic., 1961, **155**: 164-70.

The advantages and disadvantages of the permanent monoculture of vines.

5999. Eddine, M. S., and others.
Maintien de l'équilibre économique en matière de viticulture. (Mesures palliatives.) Rapports nationaux. **(Maintenance of the economic balance in viticulture. (Palliative measures.) National reports.)**
Bull. Off. int. Vin, 1961, **34**(361): 81-8.

From Switzerland, Tunisia and Turkey. [For reports from other countries see *H.A.*, 31: 4104.]

6000. Rowe, A. H., and Anderson, J. M.
Labour requirements for management planning in dried vine fruit production.
Quart. Rev. agric. Econ., Canberra, 1960, **13**: 193-8, bibl. 2.

The labour use and costs of 14 specialist sultana growers in 1959 were analysed [see also *H.A.*, 31: 2162], and the operations of pruning, cultivation, irrigation, pest and disease control, picking and drying were costed. A general regression equation is given, with factors for yield, planted area and the time taken for each operation.

6001. Panyč, N. T.
Complex mechanization for vineyards. [Russian.]
Sadovodstvo, 1961, No. 3, pp. 31-3.

Labour requirements for the highly mechanized culture of 1 ha. are tabulated and discussed.

6002. Maingonnat, A., and Palamartchouk, G. D.
Mécanisation rationnelle de la plantation et de la culture de la vigne. Rapports nationaux. **(Economic mechanization of vine planting and cultivation. National reports.)**
Bull. Off. int. Vin, 1961, **34**(361): 8-25.

Tunisia and the U.S.S.R. [For reports from other countries see *H.A.*, 30: 5073 and 31: 447, 2151 and 4101.]

6003. Cosmo, I.
Sulla riduzione dei costi in viticoltura. **(The reduction of costs in viticulture.)**
Riv. Vitic. Enol., 1961, **14**: 71-7.

Mainly by mechanization, and by adopting training systems which facilitate spraying and involve the minimum of pruning.

6004. Horánszky, Z., and Komjáti, I
Hegyvidéki nagyüzemi szőlők szállítási munkáinak gépestítése hordozható drótkötélpályával. (**Mechanization of transport work in large mountainous vineyards with the aid of mobile overhead cable traction.**) [Russian and German summaries 2½ pp. each.]
Kísérl. Közlem., Sect. C, 1960, **53C**(1): 33-64, bibl. 24, illus.

In the establishment of new, and the maintenance of bearing, vineyards on slopes too steep for self-propelled machines, cable haulage is used for the transport of materials. Various types of installation are discussed, and the development of a prototype capable of carrying material in both directions is described. The installation itself is transportable, can be erected by 4–5 men in one day (32–40 working hours) and is sufficient for 100 cadastral holds [142 acres] of vineyard area.

Vines—breeding and varieties.

(*See also* 5796.)

6005. Skuin', K. P.
The importance of selecting vine seedlings in the north for use in the southern regions where vines are covered during the winter. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(3): 35-7, bibl. 2.

In the production of new vine varieties with a stable character for winter hardiness, it is most profitable to select from seedlings raised at the northernmost limits of cultivation of the parent variety. Seedlings produced in these areas will generally have a shorter vegetative period and thus greater winter hardiness, and will not require covering for the winter. Production of a similar degree of hardiness is almost impossible in southern latitudes.

6006. Deibner, L., and Bourzeix, M.
Sur les incertitudes dans la différenciation des cépages *Vitis vinifera* et hybrides rouges par chromatographie sur papier de leurs substances colorantes. (**Uncertainty in the differentiation between *Vitis vinifera* and red hybrid varieties by paper chromatography.**)
C.R. Acad. Agric. Fr., 1960, **46**: 968-71.

P. Ribéreau-Gayon [see *H.A.*, 24: 1295j and 29: 210] has stated that anthocyanins in the form of diglucosides are never found in the grapes of *Vitis vinifera* and that the presence of these in the grape is a character of *V. riparia* and *V. rupestris*. The authors, however, have found diglucosides in wine from *V. vinifera* varieties.—Stat. centr. Techn. Prod. vég., Narbonne, I.N.R.A.

6007. Kiskin, P. H.
A polychotomous key for the identification of vine varieties. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(1): 33-6, bibl. 6, illus.

A circular 3-membered key is described for the basic classification of vine varieties into 27 groups, according to the characteristics of the leaf lobation, the pubescence of the leaves and the colour of the berries. This preliminary classification expressed in numbers is then carried further with the aid of a tabulated key which uses characters such as size of berries, shape of berries, type of petiole indentation, etc.

6008. Stover, L. H.
Progress in the development of grape varieties for Florida.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 320-3, bibl. 10.

Lake Emerald and Blue Lake have been released, and 5 further selections show promise.

6009. Stover, L. H.
Blue Lake, a new bunch grape for Florida home gardens.
Circ. Fla agric. Exp. Stats **S-120**, 1960, pp. 10, illus.

The history and culture of this variety, which is resistant, but perhaps not immune, to Pierce's disease, are discussed. Blue Lake has a limited value for sale as fresh fruit owing to the small size of its berries and its relatively short shelf life, but it provides good juice, jellies and preserves.

Vines—propagation and rootstocks.

6010. Poladze, V. R.
The importance of the method of raising grapevine seedlings. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(3): 38.

Stronger seedling growth resulted when 2–3 seeds were sown in groups 100 cm. apart, with subsequent removal of all but the strongest seedling of each group, than when seeds were sown in rows and were later thinned, or when seedlings were transplanted to the required distance apart.

6011. Gricaenko, A. A.
The electrode method of stratification of vine grafts. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(1): 36-7, illus.

The upper section of the stratification box or container (55 × 45 × 60 cm.) was reinforced with laths, 2 cm. wide, through which wooden strips were slotted to keep the grafts level. The top was packed with pine sawdust. A layer of fine sand above the heating element was located in the upper section about 3 cm. below the area of the graft union and 8·8 cm. from the top of the grafts. The electrodes consisted of 2 sheets of iron 4 × 35 cm. large and 50 cm. apart, which were 5 cm. from the walls of the container in a layer of sand 4 cm. thick. The temperature of the layer of sand was 28–31° C. near the electrodes but only 21–22° C. elsewhere in the container.

6012. LEYVRAZ, H., AND SIMON, J.-L.
Le réchauffement du sol d'une pépinière viticole. **(Warming the soil of a vine nursery.)**
Rev. romande Agric. Vitic., 1961, **17**: 27-8, bibl. 2.

In trials at Pully in 1960 the mean temperatures between 28 May and 3 June of the soil at a depth of 15 cm. (level with the heel of the rootstock) at 7 a.m., 1.30 p.m. and 6 p.m. were 17·1, 20·1 and 23·5° C. respectively in the control, 18·2, 21·1 and 23·4° C. respectively under black polythene strips and 20·2, 25·3 and 28·8° C. respectively under transparent polythene strips; the air temperatures (under shade) were 15·1, 22·0 and 20·7° C. respectively. The percentage of successful grafts of Chasselas fendant roux H.S. III on Rip. × Berl. 5C was 25 in the control, 50 under black polythene and 55 under transparent polythene.—Stats féd. Essais agric., Lausanne.

6013. POPOV, A. L.
Something new in the planting of vineyards. [Russian.]
Sadovodstvo, 1961, No. 4, pp. 30-2, illus.

Planting out in the field immediately after stratification, using 2 vine grafts per planting hole and later removing the weaker of the 2, proved to be a satisfactory and economical method of propagation, as nursery space and transplanting costs were saved. A comparison of grafted vines which had been transplanted from the nursery with those which had been planted out directly showed that the direct-planted vines produced longer shoots, more bunches of fruit per bush and higher yields than the transplants. In both cases a higher percentage of grafts survived when planted by hand then when planted by means of a hydroborer. The survival of direct-planted grafts was also increased by the application of sand plus 4 tons of compost/ha. and of 40 g. of superphosphate in each planting hole.

6014. SEMIN, V. S., MALTABAR, L. M., AND KOLESNIK, Z. V.
Methods of determining the physiological compatibility of the scion and the rootstock in grape-vines. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(2): 21-5.

Radiometric ash analyses were carried out on portions of the scion 5–7 days after radioactive potassium phosphate had been introduced into the sawdust layer of a graft stratification box. The greater the accumulation of radioactive P in the scion, the quicker was the union of rootstock and scion. In a second method described, the upper portions of grafts, including the unions, were removed on the 3rd, 7th or 10th day after grafting, covered with damp sawdust and placed in a solution of radioactive P. Radiometric analysis of the rootstock, scion and callus tissues gave some indication of their compatibility. Incompatibility was shown by differences in growth rates, increases or decreases in winter hardiness and drought resistance, and retardation or acceleration of fruiting.

6015. ERGESJAN, R. A.
The influence of the rootstock on the yield and quality of vines. [Russian.]
Vinodelie i Vinogradarstvo, 1960, **20**(8): 23-6.

The yield of 6 varieties of vine was increased when they were grown on Berlandieri × Riparia 5BB rootstock compared with Riparia × Rupestris 3309 rootstock, without a reduction in quality. Over a 3-year period at 3 different sites 5 varieties also showed an overall increase in yield on 5BB without a reduction in quality. Irrigation of vines also resulted in increased yields with only slightly reduced quality, particularly on 5BB.

6016. GEISLER, G.
Untersuchungen zum Pfropfeinfluss auf die Transpiration im Zusammenhange mit der Unterlagenzüchtung bei Reben. **(Studies on the influence of grafting on transpiration in connection with vine rootstock breeding.)**
Züchter, 1961, **31**: 8-14, bibl. 25.

Transpiration was measured on Reisling, *Vitis riparia*, F.S. 4-201-39, F.S. 4-195-39 and Kober 5 BB, both on their own roots and in all rootstock-scion combinations. Grafting was associated with increased transpiration, and there were specific differences between the various rootstock-scion combinations. Under drought conditions, however, the water loss from grafted plants fell below that from vines on their own roots. The behaviour of grafted plants seems to depend on the hindrance of water transport through the union. [See also *H.A.*, 31: 4126.]—BundesforschAnst. Rebenzücht., Geilweilerhof.

Vines—climatic factors.

(*See also* 5832, 5838, 6005, 6014.)

6017. MARUTJAN, S. A., AND MANTAŠJAN, Ė. A.
The activity of oxidising enzymes in different tissues of grape-vines in relation to their frost resistance. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(2): 31-3, bibl. 4.

In frost resistant vine varieties the activity of the peroxidases and polyphenols in the phloem increased with decreasing temperatures, but in varieties which were not frost resistant it remained at a constant level.

6018. Pogosjan, K. S.
Some characteristics of the winter hardening of grape-vines. [Russian.]
Agrobiologija, 1960, No. 5, pp. 688-93.

The optimum temperature for the first phase of hardening was found to be —3° C.; following this temperature 20–30% of buds were destroyed by freezing at —17° C. In this phase of hardening a temperature of —3° C. resulted in increased accumulation of mono- and disaccharides and reduction in starch contents. For the second stage of hardening —5° C. gave the best results, temperatures as low as —8° or —10° C. being injurious. [See also *H.A.*, 31: 4130.]

6019. Reichardt, A.
Experimentelle Untersuchungen über das Spätfrostverhalten früher Entwicklungsstadien der Weinrebe. **(Experimental investigations on the response to late frosts of vines in the early stages of development.)**
Züchter, 1961, **31**: 14-22, bibl. 41, illus.

Young vines were studied in a cold room under different conditions of temperature and humidity. When the young shoots had lost their protective covering of hair they became increasingly frost sensitive with age. A high saturation deficit allowed supercooling, whereas high humidity increased frost damage. Varietal differences in frost sensitivity were found, and the results conformed with those expected from thermoelectric measurements and the determination of soluble solids.—Inst. ZüchtForsch., Bayer. Landesanst. Gartenb., Würzburg-Veitshöchheim.

6020. Schneider, M.
Gewebetemperaturen frostempfindlicher Teile von Weinreben vor der Blattentfaltung bei der Frostschutzberegnung. **(Tissue temperatures of frost-sensitive parts of the vine before bud burst during sprinkling for frost protection.)** [English abstract 15 lines.]
Ber. dtsch. Wetterdienst., 1960, **10**(70): 1-30, bibl. 50, illus.

Observations showed that dry tissues of the vine may be cooled on radiation nights to 2° C. below the temperature of the air, indicating that evaporation at the beginning of sprinkling is not in general the cause of damage. With a temperature of —3° C. (dry thermometer) a precipitation of 1·8 mm./hr. is necessary, rising at —4·2° C. to 3·5 mm./hr. With a 4-mm. nozzle and 4·5 atm. pressure at the sprinkler, at —3° C. damage occurred in the area of smallest precipitation. Under the same conditions at —3·7° C. vines in the area of sprinkler overlap, where large droplets form, were also damaged, and at —4·2° C. the whole area was damaged.

6021. Kučerenko, F. T., and Rudjak, N. I.
A machine for covering grape-vines in the winter. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(1): 46-8, illus.

After leaf fall the branches and first year shoots of the vines are pruned, and a tractor-drawn machine passes along the inter-rows, cutting and crushing the soil surface by means of a blade. The soil falls into 2 transporters, and after being thoroughly broken up is directed onto the vines by means of a roller. The advantage of the new machine is that all the spaces between the branches and first year shoots are completely filled with earth.

6022. Peyer, E., and Koblet, W.
Versuche mit neuen Materialien zum Decken der Reben gegen Spätfröste. **(Experiments with new materials for covering vines against late frosts.)**
Schweiz. Z. Obst- u. Weinb., 1961, **70**: 348-50.

Foam plastic mats (4 mm. thick) are being tested as protective covers for vines during the danger period.

6023. Nakagawa, S., Nanjo, Y., and Hirata, N.
A study on sun-scald, a physiological disorder of grapes. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1960, **29**: 264-72, bibl. 5, illus.

When fruits on the vine were wrapped in vinyl bags of various colours, those in black or white bags, which had the highest daily fruit temperature, suffered the most from sun-scald. Normal berries subjected to high temperatures in an incubator also developed the disorder. The respiratory rate of affected fruit increased with increasing sun-scald symptoms or with increased temperatures and then fell suddenly. The affected berries contained less reducing sugar and tartaric acid than normal, and alcohol and acetaldehyde accumulated in the affected tissues. Treatment of normal berries with acetaldehyde produced sun-scald symptoms.

Vines—growth, physiology and reproduction.

(*See also* 5700, 6016, 6023.)

6024. Pirovano, A.
Aerofilia della vite. **(Aerophily in vines.)**
Riv. Vitic. Enol., 1961, **14**: 115-17, bibl. 2, illus.

Aerial roots developed in profusion from the horizontal part of a vine trunk from which a polythene "hammock" was suspended and kept half full of water for 3 months. In general, the root systems of European vines are concentrated at a depth in the soil where both moisture and air are plentiful, but they are also notably adaptable to conditions of restricted soil aeration. These contrasting characteristics appear also in certain

European-American hybrid vines such as Golia and Chasselas × Berlandieri 41B.

025. Pastena, B.
I fasci fogliari della vite. **(Leaf bundles in vines.)**
Riv. Vitic. Enol., 1961, **14**: 187-95, bibl. 36, illus.

Anatomical studies were carried out on transverse sections near successive nodes of the stems of 19 vine varieties. In general, the number of leaf-trace bundles averaged 5 in the nodes near the apex, was greater in the median region and greater still in the 5 basal nodes. There was considerable variation in different years, so that this feature was not reliable for ampelographical purposes, but in comparisons of the results for the 14 hybrid and the 5 "pure" varieties some interesting genetical relationships were noted.

6026. Durquéty, M.
À propos des anomalies morphologiques et pigmentaires et de leur transmission sexuée. **(Morphological and pigmentary anomalies and their sexual transmission [in the vine].)**
Progr. agric. vitic., 1961, **155**: 173-7, illus., and 198-201, illus.

6027. Sievers, E.
Über antiphytotische Stoffe im Schnittholz der Weinrebe (*Vitis vinifera* L.). **(On antiphytotic substances in prunings of the vine.)**
Naturwissenschaften, 1961, **48**: 508, bibl. 2.

Cold water extracts of woody tissues of the vine reduced the percentage germination, and strongly inhibited the seedling development, of cress and poppy. They also strongly depressed root growth in the tomato, and callus formation preceding root growth in the vine itself.—Lehr- u. ForschAnst. Gartenb., Geisenheim.

6028. Filippenko, I. M.
Effects of gibberellic acid on the growth, development and fruiting of vines. [Russian.]
Agrobiologija, 1960, No. 5, pp. 770-3, illus.

Soaking grape seeds in GA solution did not affect seedling growth, but application of GA at the cotyledon stage increased growth in height and number of leaves produced for 2 months after treatment. By the third month the control plants equalled those treated with GA and had larger leaves. Treatment of flower clusters with GA resulted in poor setting of grapes.

6029. Geisler, G.
Transpirations- und Atmungsuntersuchungen an Rebenholz. **(Studies on the transpiration and respiration of the wood of vines.)** [English, French and Spanish summaries ⅓ page each.]
Mitt. Klosterneuburg, Ser. A, 1961, **11A**: 1-11, bibl. 13.

The respiration and water loss of different *Vitis* species, varieties and interspecific hybrids were examined in relation to the maturity of the wood and resistance to drought. Water loss was measured by weighing the wood, stored at constant temperature and humidity, at intervals during 100 days. Both respiration and water loss were characteristics of the species and variety. Respiration was measured before and after watering the wood; it was found that watering produced a rise in CO_2 production which was inversely related to its initial value before watering. CO_2 production was especially low from October to December. Drought resistance in seedlings was correlated with low respiration. [See also *H.A.*, 31: 4125 and 4126.] —BundesforschAnst. Rebenzücht., Geilweilerhof.

6030. Eifert, J., Pánczél, M., and Eifert, A.
Änderung des Stärke- und Zuckergehaltes der Rebe während der Ruheperiode. **(Changes in the starch and sugar contents of the vine during dormancy.)**
Vitis, 1961, **2**: 257-65, bibl. 15.

In *Vitis riparia portalis* and Teleki 5C the starch-sugar interconversion with starch maxima in spring and autumn, reported in other countries, was confirmed. The changes in total carbohydrate content showed that a hemicellulose-sugar interconversion takes place. In terms of carbohydrate metabolism the period of dormancy could be subdivided into 2 phases. In the first, the endogenous rest period, the starch-sugar interconversion is independent of temperature and is irreversible. In the second, the induced dormancy phase, the direction of the starch-sugar change is determined by temperature. During the fall in total carbohydrate content in spring, starch also falls but sugar remains constant. With different conditions of overwintering the changes in level of carbohydrates followed similar courses, suggesting that these processes are endogenously determined.—Lab. Vine Res., Balatonboglár, Hungary.

6031. Alleweldt, G.
Untersuchungen über die Kausalität zwischen Gibberellinbehandlung und Austriebshemmung bei Reben. **(Investigations into the relationship between treatment with gibberellin and the delay of bud burst in the vine.)**
Vitis, 1961, **2**: 266-82, bibl. 13, illus.

GA was applied in lanolin or as an aqueous spray to 1–2-year-old potted seedlings and cuttings of Riesling and Sylvaner vines. Treatment shortly before bud burst resulted in an extension of dormancy and a decrease in the number of buds developing, but caused an increased rate of growth of the shoots that did develop. When GA was applied during dormancy, its delaying effect on bud burst diminished as the time of treatment approached the onset of growth. Treatment before the winter rest period had no effect on the vigour of growth of the shoots, whereas treatment just before the breaking of dormancy led to an increased rate of growth. [For earlier work see *H.A.*, 31: 431.]—BundesforschAnst. Rebenzücht., Geilweilerhof.

6032. Blagonravov, P. P.
A method of investigating the fertility of vine buds during the period of winter dormancy. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(1): 29-33, bibl. 1.

The dormant buds on 20–25 shoots of several varieties were sectioned longitudinally to examine the development of the embryo from flower initiation up to flowering.

6033. Aldebert, P., and others.
Causes déterminant les altérations de la floraison de la vigne. Rapports nationaux. **(Factors affecting the flowering of the vine. National reports.)**
Bull. Off. int. Vin. 1961, **34**(361): 37-51; (362): 34-54; (363): 29-39.

From Algeria, Portugal, Israel, Turkey, Italy, Austria and Luxembourg. [For reports from other countries see *H.A.*, 31: 4141.]

6034. Coombe, B. G.
Morphogenesis, growth and changes in sugars, auxins and gibberellins in the fruit of *Vitis vinifera*.
Abstr. in *Aust. J. Sci.*, 1960, **22**: 481.

The fruits of 2 seeded and 2 stenospermocarpic (abortive seeded) varieties and of 1 parthenocarpic variety were sampled periodically between anthesis and maturity, and measurements were made of meristematic activity, berry volume, juice sugar content and the levels of auxins and gibberellins. All varieties showed a double-sigmoid growth curve. The first growth cycle of seeded varieties was paralleled by a rise and fall in meristematic activity in the seeds and by auxin levels. In seedless berries the rise and fall of auxin levels and "seed" meristematic activity was brief compared with the first growth cycle. Gibberellin activity was found in young berries of the three seedless varieties but not in seeded berries. This correlates with the known fact that seedless berries enlarge much more than seeded berries after treatment with gibberellin, auxin or by girdling. Mature stamens of all varieties showed gibberellin activity. The second growth cycle could not be correlated with morphological, auxin or gibberellin changes; but it could be related to the influx of sugars into the berries and it is suggested that sugaring causes this growth osmotically. A second rise in auxin levels reached a peak at the beginning of the second growth cycle and of sugaring; this could not be associated with embryo development because it occurred in seedless berries. [Author's abstract.]—Waite agric. Res. Inst., Adelaide.

6035. Muthuswamy, S., and Abdul Khader, J. B. M. M.
A note on the occurrence of a seedless bunch in Habshi, a seeded variety of grape (*Vitis vinifera* Linn.).
South Indian Hort., 1959, **7**: 22-3, bibl. 2, illus.

At Coimbatore, probably a bud sport.

Vines—training and pruning.

(*See also* 6045.)

6036. Decker, —., and others.
Systèmes rationnels de conduite et de taille. Rapports nationaux. **(Rational systems of [vine] training and pruning. National reports.)**
Bull. Off. int. Vin, 1961, **34**(361): 26-36; (362): 5-33; (363): 4-28; (364): 3-48; (365): 4-37.

From Germany, Argentina, Austria, Bulgaria, Chile, Spain, France, Algeria, Greece, Hungary, Israel, Italy, Luxembourg, Morocco and Portugal.

6037. Moretti, A.
La convenienza economica dei sistemi di allevamento alti della vite e influenza sulla quantità e qualità della produzione nell'Italia settentrionale. **(The economic advantage of high training systems for vines and their effect on the quantity and quality of production in northern Italy.)**
Riv. Vitic. Enol., 1961, **14**: 152-60, 175-86, bibl. 9, illus.
Die wirtschaftliche Zweckmässigkeit der Systeme der hohen Erziehung der Rebe und ihr Einfluss auf Menge und Qualität der Erzeugnisse in Norditalien. **(The economic advantage of high training systems for vines and their effect on the quantity and quality of production in northern Italy.)** [English, French and Spanish summaries 10 lines each.]
Mitt. Klosterneuburg, *Ser. A*, 1961, **11A**: 57-77, bibl. 14.

Descriptions are given of the pergola system of vine training, with Italian regional variations, the tree system, in which various species of trees are pollarded and used as living supports, and the ray system, in which each of the tall posts supports 4 vines that are trained outward near the top. The 4 pruning systems, spurred cordon, multiple Guyot (Cazenave), Sylvox and ray, are compared for their effects on the times of bud burst, flowering and fruit ripening, and on fruit yield and quality. Production figures and planting costs are given, and it is concluded that high training combined with long or mixed pruning saves 30–40% of the labour cost and gives 50–100% higher fruit yields with no reduction of quality, compared with the low training systems, thus more than compensating for the higher cost of establishment.

6038. Beattie, J. M.
Trellising improves grapes.
Ohio Fm Home Res., 1961, **46**(1): 6, illus.

Where high yields of Concord grapes are obtained on vigorous vines an improvement in fruit quality may be achieved by training the fruiting canes on special trellises to give adequate exposure to sunlight. One type of trellis used consisted of 8 arms, each 4 ft. in length arising from a single point about 6 ft. above ground level and extending outward and upward at 45 degrees. Vines trellised in this way produced clusters 11–17% larger and the fruit had an 8–10% higher soluble solids content than that from untrained vines.

6039. Myrianthousis, T. S.
Pruning grape vines.
Countryman, Nicosia, 1961, Jan./Feb., pp. 20-3.

Spur-pruning for wine varieties, rod-pruning for table-grapes, and trellis construction described.

6040. Malan, A. H.
Bearing habits of Barlinka vines.
Fmg S. Afr., 1961, **37**(2): 33-4, illus.

Although maximum fertility was found in the 7th bud, the results of the past 3 years' work at the Hex Valley experimental plot at De Doorns indicated that Barlinka vines should be pruned to leave 6 buds per shoot on 12 bearing shoots per vine, plus additional short bearers of two buds each. To increase the crop the number of shoots should be increased and not the number of buds per shoot.

6041. Antcliff, A. J., Webster, W. J., and May, P.
Studies on the sultana vine. VII. A comparison of crop regulation by pruning with crop regulation by disbunching.
Aust. J. agric. Res., 1961, **12**: 69-76, bibl. 6.

In 3 out of 4 seasons both methods of regulation gave similar yields, and only in 1 season did disbunched vines yield somewhat better than more severely pruned vines with the same number of bunches. This better yield appeared to be due to larger berries on the disbunched vines. Increased vegetative growth on the disbunched vines was not accompanied by improved fruit bud formation or by better bud burst in the following season. It is concluded that the leaf/fruit ratio has little effect on the yield of sultanas under Murray Valley conditions, and that methods of crop forecasting and regulation by pruning developed for this region should not be affected by the variation in leaf/fruit ratio to which they give rise. [From authors' summary. For Part VI see *H.A.*, 28: 3446.]—C.S.I.R.O., Merbein, Victoria.

Vines—soil management, irrigation and nutrition.

(*See also* 5655, 5852, 6015, 6125, 6126, 6188, 6232, 6233, 7264.

6042. Beljaev, G. M., and Loženicyn, I. P.
The use of the cultivator KKN-2.25 in vineyards in mountainous zones. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(3): 43-4, illus.

A new type of cultivator designed for use on sloping or stony land is described and illustrated by diagrams. The cultivator is adjustable in width and the tines are spring-loaded to avoid damage by stones.

6043. Akimov, A. S.
Mechanization of inter-row cultivation in mountainous vineyards with the aid of rope traction. [Russian, with English summary 6 lines.]
Izv. Timirjazev. sel'sk. Akad., 1961, No. 1, pp. 230-7, illus.

Several methods of using rope haulage for inter-row cultivation in vineyards on steep slopes unsuitable for the use of self-propelled machines are described, and their economics are discussed.

6044. Tonkonoženko, E. V.
Soil in relation to grape quality. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(1): 27-9, bibl. 4.

Trials of 4 vine varieties grown on weakly alkaline, alkaline and weakly acid soils showed that the sugar content of the grapes was higher and the acidity of the juice lower in all varieties grown on the weakly acid chernozems. Heavy acid soils are suitable for growing vines for table and champagne wines, whereas well cultivated alkaline soils are suitable for vines used in the preparation of dessert and heavy wines.

6045. Tulloch, H. W.
Nuriootpa Viticultural Station seeks the answers to problems of dry-land vineyards.
J. Agric. S. Aust., 1961, **64**: 246-53, illus.

Trials are reported on fertilizers, cultivation, weed control, spacing, time of incorporating cover crops, irrigation and pruning. No yield responses were obtained in the first 4 trials, but results in the 5th showed that cover crops should be turned under before the end of August. Irrigation in late spring, summer or winter increased yields by 25%. The pruning trials showed that the pruning levels generally used in the early stages are too severe. Vine selection and breeding work is also reported.

6046. Schrader, T., and Steinlein, B.
Neue Erfahrungen mit der Gründüngung im Weinbau. **(New experience with green manuring in the vineyard.)**
Weinberg u. Keller, 1961, **8**: 137-51, bibl. 5, illus.

Green manuring with lucerne, Bokhara clover and perennial lupin led in each case to drought damage to the vines. An August sowing of winter vetch in every 2nd row, which was dead by the following July, caused no drought damage and prevented silting and compaction of the soil during a period of continuous rainfall. During drought it also helped to reduce water loss from the soil.—Landes-Lehr- u. Versuchsanst., Trier.

6047. Huglin, P.
Les désherbants chimiques en viticulture. **(Chemical weed killers in viticulture.)**
Phytoma, 1960, **12**(114): 7-13, illus.

A brief review of French and Swiss work with 6 herbicides. Dalapon has been used in several areas at rates up to 10 kg./ha. without injuring the vines, but in the Languedoc it caused serious injury to rootstocks. Monuron has caused injury on light soils, even at low rates, and is injurious when in direct contact with the vines; in a wet year 5 kg./ha. caused marginal chlorosis whatever the soil, the rootstock or the age of the vine, but in other trials rates up to 40 kg./ha. on heavy soils have not caused injury. Diuron is more toxic to vines than monuron, and on light soils rates should not exceed 3 kg./ha. No injury has so far been reported from simazine at rates up to 40 kg./ha. Satisfactory results have been given by amitrole 10 kg./ha. + simazine 3 kg./ha. and by DNOC 5 kg./ha. + diuron 3 kg./ha.—Stat. Rech. vitic., Colmar,—From *Weed Abstr.* **10**, No. 679.

6048. Leonard, O. A., and Lider, L. A.
Toxicity and translocation of herbicides supplied to grape rootings through solution culture.
Amer. J. Enol. Vitic., 1961, **12**: 37-46, bibl. 14.

Monuron and diuron caused the most injury to rooted vine cuttings, followed by simazine and atrazine. 2,4-D killed the roots at higher concentrations, but amitrole did not injure the plants. Monuron, simazine and amitrole were readily absorbed by the roots and translocated to the leaves, but there was no appreciable evidence of retranslocation from the leaves to the fruit.—Univ. Calif., Davis.

6049. Vagnoli, G. B. T.
Prove di irrigazione della vite da vino in Maremma. (**Irrigation experiments with wine grape-vines in the Maremma area.**)
Frutticoltura, 1961, **23**: 289-93, bibl. 5, illus.

In a season of moderate rainfall the 3 vine varieties concerned each received the following irrigation treatments: (a) 3 applications at approximately fortnightly intervals from mid-July to mid-August, totalling 12·6 mm.; (b) the first application was omitted and the total was 7·1 mm.; (c) only the last irrigation was given, amounting to 4·6 mm. The controls were not irrigated. The incidence of downy mildew was unaffected, but that of powdery mildew and *Botrytis cinerea* was increased with increasing water supply. Fruit ripening was slightly delayed by treatment (a). With negligible exceptions fruit yield per vine, fruit size and bunch weight were increased by increasing water supply. In the variety Trebbiano the sugar content of the must decreased with increasing irrigation; it was unaffected in Colorino and the response was inconsistent in Sangiovese. The yield response was most marked in Trebbiano.

6050. Ehlig, C. F.
Effects of salinity on four varieties of table grapes grown in sand culture.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 323-31, bibl. 13.

Own-rooted plants of Black Rose, Cardinal, Perlette and Thompson Seedless were grown in sand culture with a nutrient solution, to which salts were added to achieve the following 6 treatments in terms of osmotic pressure of added salts: 1 atm. mixed chlorides, 2 atm. mixed chlorides, 2 atm. $CaCl_2$, 2 atm. NaCl, 2 atm. Na_2SO_4 or no salt. Chloride accumulation from high chloride treatments caused burn on leaf blades of all varieties. Injury developed very rapidly at temperatures above 100° F., but very slowly at temperatures below 90° F. Treatments containing large amounts of calcium in addition to chloride were much more injurious than the NaCl treatment. Black Rose and Cardinal were much more sensitive to chloride than Perlette and Thompson Seedless, because they accumulated chloride two to three times faster. All varieties were injured by chloride earlier with each succeeding season. High concentrations of sulphate in the Na_2SO_4 treatment caused Mg deficiency symptoms on all varieties. Salinity reduced vine growth, but growth was adequate on all treatments where chloride injury did not cause vines to deteriorate. Excessive growth caused lower fruit production on the non-saline treatment than on the saline treatments. Yields of all varieties on the 2 atm. salt treatments averaged about 30 to 45 lb. per vine, except for Black Rose and Cardinal on the mixed chloride and $CaCl_2$ treatments where vines died or nearly died. [From author's summary.]—U.S. Salinity Lab., Riverside, Calif.

6051. Cosmo, I.
La concimazione della vite. (**The manuring of vines.**)
Riv. Vitic. Enol., 1961, **14**: 139-51, bibl. 21.

A review covering the N, K and P requirements of vines, with brief mention of minor elements, organic manures, inorganic fertilizers, deep placement of P and K, and foliar nutrition.

6052. Vergnes, A.
Analyse des résultats numériques d'un essai de fumure sur la vigne. **(Analysis of the numerical results of a vine manurial trial.)**
Progr. agric. vitic., 1961, **155**: 228-31.

In a trial with Aramon vines grafted on Riparia the application of 400 kg. N per ha. as nitrate of lime increased grape yields from 5,098 to 5,606 kg./ha.

6053. Branas, J., and Vergnes, A.
Récents progrès dans la fumure de la vigne. **(Recent progress in vine manuring.)**
Progr. agric. vitic., 1961, **155**: 78-86, 135-42, and 201-5.

From a study of fertilizer responses on 3 types of vineyard soil it was concluded that, whereas N fertilization was advantageous on the acid and sandy-calcareous soils, it was ineffective on the clayey-calcareous soils.

6054. Isoda, R.
Effects of winter and spring applications of nitrogen fertilizer on the growth of grapevines. [Japanese, with English summary.]
Bull. Hiroshima agric. Coll., 1960, **1**(3): 23-6, from *Biol. Abstr.*, *Sect. D*, 1961, **36**, Abstr. 35,273.

The comparative effects of winter and spring applications of N fertilizer were examined with special reference to its absorption and upward movement. N applied in the winter was absorbed by roots even during the dormant period, but it was not translocated until top growth began. N applied in the spring, just before growth started, was rapidly absorbed by the roots and translocated to the shoots as soon as the buds opened. There was no difference between winter and spring applications of N on the early stages of shoot growth. The retarded growth of the winter-treated plants at a later stage of development appeared to be due to leaching of N.

6055. Raman, K. R.
Effect of potash on the quality of grape variety Pachadraksha.
South Indian Hort., 1959, **7**: 12-14, bibl. 11.

Applications of 2½ and 3 lb. of KCl per vine increased the sugar content of the grapes, which were of better appearance and quality than those from vines given only 2 lb.

6056. Gärtel, W.
Die Verteilung von Kalium und Magnesium in Reben unter normalen Ernährungsbedingungen und bei Kaliummangel. **(The distribution of potassium and magnesium in the vine under conditions of normal nutrition and of potassium deficiency.)**
Weinberg u. Keller, 1960, **7**: 481-9, bibl. 19.

The value of the ratio K:Mg was determined in various tissues of normal and K-deficient Riesling and Müller-Thurgau vines on different rootstocks. The value of this ratio for the healthy leaves was about 6·8, and for leaves showing K deficiency symptoms it was 0·2 in the lamina and 0·1 in the petiole. The values found for K and Mg were not influenced by the variety, the rootstock or the amount of growth. In buds and seeds the level of K was almost constant, but with K deficiency a relatively higher level of Mg was found in the buds. —Inst. Rebenkrankh., Bernkastel-Kues.

6057. Gärtel, W.
Beitrag zur Kenntnis des Magnesiummangels bei Reben. **(A report on the recognition of magnesium deficiency in vines.)**
Landw. Forsch. Sonderh. **13**, 1959, pp. 45-58, bibl. 33, illus.

Magnesium deficiency appears in two forms on vine leaves, being necrotic on young leaves and chlorotic on mature leaves. Mg deficiency occurring at the same time as P deficiency causes a severe growth disturbance, called "acid injury", which appears as irregular browning and marginal necrosis. With increasing severity of Mg deficiency, leaf contents of Mg and P both decrease, while that of K increases. Petiole contents of Mg and P are relatively higher than those of the leaf-blade. Leaves showing "acid injury" have low contents of Mg and P, and the P content of the petiole is strikingly low. The chlorophyll content of Mg-deficient leaves is also reduced, and the ratio of chlorophyll *a* to *b*, which is 1:1 in normal leaves, becomes 3:1 in the chlorotic areas. The proportion of chlorophyll-bound Mg is 4 to 30% of the total Mg, and is higher in the chlorotic areas than in the green parts of the leaf.—Inst. Rebenkrankh., Bernkastel-Kues.

6058. Dobroljubskij, O. K.
An important means of raising the yield of vines. [Ukrainian.]
Vinogradarstvo i sadivnictvo Krimu, 1959, No. 3, pp. 14-16, from abstr. in *Gartenbauwiss.*, 1960, **25**: 67.

Increased yields of 32–57% resulted from applications of $ZnSO_4$ in quantities of 0·005 g. per vine, or as 0·25 g. in 10 l. of bordeaux mixture applied as a spray 2–3 times in summer.

Vines—defoliation.

6059. Larsen, R. P.
Chemical defoliation of Concord grapes prior to harvest.
Quart. Bull. Mich. agric. Exp. Stat., 1961, **43**: 830-8, bibl. 10, illus.

Various defoliant chemicals were applied to vines 1 week prior to harvest, and the degree of defoliation and corresponding fruit drop were observed, as well as effects on the fruit and subsequent growth of the vines. Magnesium chlorate and sodium chlorate were the most promising of the defoliants tried, and the consequent slight increase in berry drop may be an advantage in mechanical harvesting.

Vines—fruit quality.

(*See also* 5707, 6034, 6038, 6044, 6055, 7264.)

6060. Lomkaci, S. I.
A study of wine quality in relation to cropping of the grape-vine. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(3): 26-9, bibl. 7.

It was shown that, to obtain the highest quality wine, the crop per vine and various cultural factors should be strictly controlled. In vines bearing 7 kg. of fruit the alcohol content of the wine was reduced to 9·2%, compared with 11·2% from vines bearing 4 kg. of fruit, owing to the reduced ratio of leaves to fruit. At least 10 leaves per bunch of fruit were required for high quality wine. Spacing of the shoots on the wires was important, and watering later than 25–30 days before harvest was detrimental.

6061. Negrul', A. M.
The relationship between grape yields and quality. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(1): 22-6, bibl. 9.

A discussion of the edaphic, climatic and varietal factors affecting yield and quality.

Temperate nuts.

(*See also* 5796, 6228, 6652.)

6062. Weaver, W. S.
Culture of Chinese chestnuts in the north.
51st A.R. north. Nut Grs' Ass., 1960, pp. 29-31.

Brief notes on fertilization with NPK, pest control with DDT, malathion and rodent bait, transplanting and varieties.

6063. Crane, H. L.
Establishing a Chinese chestnut orchard.
51st A.R. north. Nut Grs' Ass., 1960, pp. 22-9.

Soils should be slightly acid and well drained. High uniform temperatures are favourable, although the trees can withstand —25° to —30° F. without injury when fully dormant. Most existing trees are seedlings, but grafted trees come into bearing earlier; for pollination 2 or more varieties should be grown. The recommended density is 60–70 to the acre; the trees should be planted in early spring, and the low branches should not be removed until the higher branches have developed to shade the trunk. The annual application of an NPK fertilizer is beneficial.—U.S.D.A., Beltsville, Md.

6064. Berry, F. H.
Relative resistance of some chestnut species and hybrids inoculated with the blight fungus.
51st A.R. north. Nut Grs' Ass., 1960, pp. 46-7, bibl. 1; and *Plant Dis. Reptr*, 1960, **44**: 716-17, bibl. 1.

Chinese chestnut (*Castanea mollissima*) was the most resistant and American chestnut (*C. dentata*) the least resistant to *Endothia parasitica* of the 4 species tested. First generation hybrids between the Chinese and American species were very susceptible, but back crosses of these hybrids to the Chinese parent were considerably more resistant.—U.S.D.A., Beltsville, Md.

6065. Graves, A. H., and Jaynes, R. A.
Chestnut breeding—report for 1958 and 1959.
50th A.R. north. Nut Grs' Ass., 1959, pp. 62-71, bibl. 11.

Recently 3 outstanding blight-resistant hybrids have been released under the names Essate-Jap, Sleeping Giant and Kelsey. The importance of inarching for the control of *Endothia parasitica* is emphasized.

6066. McKay, J. W., and Berry, F. H.
Radiation-dosage tests with young Chinese chestnut trees.
51st A.R. north. Nut Grs' Ass., 1960, pp. 58-60, illus.

In 1959 the maximum dosage of radiation from a Co^{60} source tolerated by 3-year-old trees was 5,000–10,000 r. In 1960 dosages of 2,500–5,000 r. were found to induce a percentage of branched catkins. —U.S.D.A., Beltsville, Md.

6067. Berry, F. H.
Germination of Chinese chestnut seed.
51st A.R. north. Nut Grs' Ass., 1960, pp. 40-2.

Data are presented which show that Chinese chestnut seeds should be stored after ripening for at least 6–8 weeks at 30–32° F. to break their dormancy, and that even more rapid germination occurs if the cold treatment is prolonged up to about 40 weeks.—U.S.D.A., Beltsville, Md.

6068. McKay, J. W., and Gossard, A. C.
Effect of nut size on growth of Chinese chestnut seedlings.
50th A.R. north. Nut Grs' Ass., 1959, pp. 56-60, bibl. 2.

The largest nuts in 2 varieties of *Castanea mollissima* produced the largest seedlings in the 1st year of growth, but after 4 years the differences had practically disappeared.—U.S.D.A., Beltsville, Md, and Meridian, Miss.

6069. Diller, J. D.
A method for "direct seeding" chestnuts in the field.
50th A.R. north. Nut Grs' Ass., 1959, pp. 61-2, bibl. 1.

The germination of nuts planted under forest conditions and each covered with a bottomless can with a perforated top, as a protection against rodents, was practically the same as that of nuts planted in prepared seed beds.

6070. Hardy, M. B.
The propagation of Chinese chestnut trees.
51st A.R. north. Nut Grs' Ass., 1960, pp. 36-40.

The methods which have proved most successful on a nursery in Georgia are described. The rootstocks are obtained from spring-sown nuts selected for size, and are frameworked by the spliced graft method using pressure-sensitive tape. No form of budding has been successful.

6071. Stoke, H. F.
Topworking Chinese chestnuts.
51st A.R. north. Nut Grs' Ass., 1960, pp. 42-4.

The optimum time for grafting is when the buds are beginning to swell and the bark is slipping. The saw cut on the stock should be made at not less than 45° to the horizontal, and a bark graft inserted. No evidence of incompatibility of *mollissima* on *mollissima* has been found, but incompatibility between *mollissima* and Japanese species or hybrids is common.

6072. Ichii, T.
Growth studies of chestnut fruits. I. Developmental changes in the chemical composition of chestnut fruits. [Japanese, with English summary ⅔ p.]
J. hort. Ass. Japan, 1960, **29**: 281-6, bibl. 13.

The dry matter, carbohydrates, N. P and K contents of Gin-yose chestnut fruits were determined periodically throughout the development of the fruits, and 2 growth cycles were observed. In the first the dry matter, P, K and N increased rapidly in the bur and reducing sugars in the nut reached a maximum. In the second cycle there was a rapid increase in the dry matter of the nut at the expense of the bur, which absorbed water and showed a high concentration of reducing sugars. The K and P contents of the bur increased slowly in the second stage and insoluble N decreased. A rapid accumulation of non-reducing sugars and starch, soluble and insoluble N, P and K occurred in the nut at the time of the active growth of the embryo.

6073. Wright, W. R.
Storage decays of domestically grown chestnuts.
Plant Dis. Reptr, 1960, **44**: 820-5, bibl. 9, illus.

In a study of the storage rots of Chinese chestnuts (*Castanea mollissima*) 12 genera of fungi, in addition to various bacteria and yeasts, were recovered from the decayed kernels. *Phoma castanea*, *Dothiorella* sp., *Cytodiplospora castaneae* and *Pestalotia* spp. accounted for over 75% of the fungi recovered, but none of these fungi was recovered from nuts exposed to gamma irradiation of 283,000 r. The high incidence of decay suggests that bulk storage of chestnuts is unsatisfactory, and the feasibility of shelling prior to grading, and of quick freezing, is being investigated.—Agric. Mktg Serv., U.S.D.A., Chicago.

6074. Gudin, C., and Hervé, J.-J.
Analyse statistique de résultats d'expériences de trempage de châtaignes. (**Statistical analysis of the results of experiments on soaking chestnuts.**)
C.R. Acad. Agric. Fr., 1960, **46**: 998-1002, bibl. 6.

Ten kg. lots of Combale chestnuts were stratified in sand at 10° C. in an airy cellar for 30 days after soaking for 0, 2, 4 and 8 days [see also *H.A.*, 31: 2172]. The mean numbers of fungus-infected nuts were 25·5, 17·25, 14·25 and 7·25 per 50-nut sample, respectively.

6075. Talbott, J.
Filberts for the Middle West.
51st A.R. north. Nut Grs' Ass., 1960, pp. 78-80.

For all round dependability, the Jones hybrids Bixby and Buchanan are recommended; for the more northerly areas, Winkler and Rush hazels.

6076. Slate, G. L.
Winter injury of filberts at Geneva, N.Y., 1958-59.
50th A.R. north. Nut Grs' Ass., 1959, pp. 75-6, bibl. 2.

A list is given of varieties in which 100% of the catkins were killed by frost. Injury, however, was very slight in Bixby, the German varieties Louisen and Neue Riesennuss and *Corylus colurna*.

6077. Talbott, J. E.
Notes on filbert pollination.
50th A.R. north. Nut Grs' Ass., 1959, pp. 76-8.

Wide variations were found in the time of receptivity of the pistillate flowers of different varieties, whereas the male flowers shed their pollen over a short period. In general, American varieties had receptive pistils before the pollen was shed, but with European varieties except Barcelona and Du-Chilly the reverse was the case. The planting of 2 or more varieties is recommended.

6078. De Rosa, M.
La concimazione del noccioleto. (**The manuring of hazel-nut plantations.**)
Progr. agric., Bologna, 1961, **7**: 740-6, illus.

Composition figures are quoted for branches, nut shells and kernels of hazel [see also *H.A.*, 31: 467]. In the Italian province of Avellino the cover crops sown under hazel are various leguminous plants with a very small proportion of brassicas. The increase in soil organic matter obtained with these crops is greatest when sheep or cattle are penned on them, slightly less from grazing, and less still from green manuring. For mature trees in this region the recommendation for autumn manuring (immediately before sowing the cover crop) is either 300 quintals of farmyard manure and 6 of superphosphate per ha., or 6–8 quintals of 6–12–9 inorganic fertilizer per ha. The alternative recommendations for spring application, in quintals per ha., are 4–5 of ammonium sulphate, or 3–4 of calcium cyanamide (6 if irrigated), or 1·5–3 of ammonium nitrate. [1 quintal = 100 kg.] Irrigation from May to mid-August with 2,500–3,500 cu. m. of water per ha, has proved profitable.

6079. Smith, G. L.
Hickory nut varieties for New York and New England.
51st A.R. north. Nut Grs' Ass., 1960, pp. 77-8.

For New York and more southerly states, Wilcox and Davis; for farther north, Anthony No. 2 and Westchoke.

6080. Fowler, M. L.
Projections of production and price of pecans in the United States to 1975.
Tech. Bull. Okla. agric. Exp. Stat. **T-88**, 1960, pp. 34, bibl. 19.

6081. Pope, T. E., and McFadden, S. E., Jr.
Preliminary comparison of wrapping materials in grafting pecans.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 332-4, bibl. 6.

The number of successful grafts of the Curtis variety on Stuart rootstocks was 5 times greater when they were wrapped in vinyl film and soil mounded than when they were wrapped with waxed twine and mounded. Omission of soil mounding greatly reduced the survival of vinyl-wrapped grafts. With the variety Stuart on the same rootstock there was no significant difference between 4 treatments tested, although vinyl film plus mounding did give the highest percentage of graft survival.—Fla agric. Exp. Stat., Gainesville.

6082. Hinrichs, H.
Development of native pecan groves.
50th A.R. north. Nut Grs' Ass., 1959, pp. 29-31.

In native stands of pecans superfluous trees should be removed until the density is reduced to 28–32 sq. ft. of cross-sectional area of trunks per acre, measured at breast height. Pasturing and cover-cropping are recommended according to local conditions. The smaller trees should be top-worked with suitable varieties.

6083. Maurer, K. J.
Die Walnuss im Erwerbsanbau. **(The walnut as a commercial crop.)**
ErwObstb., 1961, **3**: 66-9, illus.

Based on 12 years' experience of walnut growing in different parts of Germany, recommendations are made for cultivation on a large scale. Climatic and soil requirements, rootstocks, varieties, planting distances and cultural practices are discussed. French varieties gave very poor results under German conditions, but a number of German varieties gave very high yields, notably Esterhazy II and 6 unnamed selections.

6084. Smith, G. L.
Carpathian Persian (English) walnut varieties for New England.
51st A.R. north. Nut Grs' Ass., 1960, pp. 62-5.

McKinster, Hansen, Metcalfe, Orth, Morris and Deming are the best 6 of 23 varieties recommended for home orchards or shade trees.

6085. Becker, G.
Carpathian [walnut] varieties for the northern States.
51st A.R. north. Nut Grs' Ass., 1960, pp. 65-8.

Broadview recommended.

6086. Dunstan, R. T.
Persian walnuts and hickories for the Upper South.
51st A.R. north. Nut Grs' Ass., 1960, pp. 74-6.

Of the walnuts Hansen is considered the most suitable, followed by Mundt and Bedford. The best shagbark hickory is Fox and the best hybrid hickory Berger.

6087. Shelton, E. N.
Grafting experience.
50th A.R. north. Nut Grs' Ass., 1959, p. 84.

Reporting more success with walnut scions when coated with wax.

6088. Becker, G.
Greenwood budding of heartnuts and other nut trees.
50th A.R. north, Nut Grs' Ass., 1959, pp. 78-83.

After reviewing the relevant literature the author describes a method of budding Japanese walnuts, using budwood with 2–4 leaflets attached, and skin budding (a form of plate budding) on 4- to 5-year-old seedling black walnuts on the north side about 8 in. above ground level. The bud unions were wrapped in a 3-in. wide strip of polythene sheet until the buds were well callused.

6089. Čžu Cty.
Methods of grafting walnut. [Russian.]
Sadovodstvo, 1961, No. 3, pp. 25-6, illus.

Seedlings of the Manchurian walnut rootstock were grown in sawdust in the greenhouse and at potting up the roots were cut back by half to encourage the growth of laterals. Two weeks later the tops were pinched out. After 2½ months the rootstock seedlings were ready for grafting with the Persian walnut scions at the 1–2-leaf stage. The rootstock was cut back to the level of the collar and the scion was cut above the cotyledons. The wedge-shaped end of the scion was inserted in a slit (2–3 cm. long) in the rootstock, and the grafted area was bound and coated with a mixture of chalk and clay. After 2–3 weeks at 20–28° C. and 70–75% R.H. the grafted plants began to grow. After 2 years they were observed to be stronger and hardier and to cease vegetative growth earlier than ungrafted seedlings.

6090. Serr, E. F.
Learning to live with walnut blackline.
50th A.R. north. Nut Grs' Ass., 1959, pp. 51-4.

For new plantings in areas where blackline, a symptom of delayed incompatibility, is prevalent, and in the absence of the oak root fungus, Persian walnut seedlings should be used as rootstocks. Where the fungus is present Northern California black walnut rootstocks are recommended. For replanting or interplanting in old orchards, Paradox hybrids will make better growth than black walnut rootstocks, especially if top working is delayed for some years. Affected trees can be salvaged by re-grafting before the limbs are completely girdled. —Univ. Calif., Davis.

PLANT PROTECTION OF TEMPERATE FRUITS.

General.

6091. Casarini, B.
"Calendari" dei trattamenti antiparassitari alle piante fruittifere. (**Spray programmes for fruit crops.**) [French summary 1½ pp.]
Frutticoltura, 1961, **23**: 153-91, illus.

For vines, apples, pears and peaches.

6092. Savkovskij, P. P.
Protective measures for fruit plantings. [Russian.]
Sadovodstvo, 1961, No. 3, pp. 23-4.

A spray programme for pest and disease control on tree and small fruits in the Ukraine.

6093. Wilhelm, S.
Diseases of strawberry. A guide for the commercial grower.
Circ. Calif. agric. Exp. Stat. **494**, 1961, pp. 26, illus.

Including control measures and coloured plates of disease symptoms.

6094. Goidànich, G., and Casarini, B.
Il calendario dei trattamenti alla vite. (**The spray programme for vines.**)
Progr. agric., Bologna, 1961, **7**: 620-31, illus.

For protection from, and control of, downy mildew, powdery mildew, yellow mites and moths [unspecified].

6095. Phillips, A. M., Large, J. R., and Cole, J. R.
Insects and diseases of the pecan in Florida.
Bull. Fla agric. Exp. Stats **619**, 1960, pp. 84, bibl. 3, illus.

Maladies due to adverse nutritional and climatic factors are included; there is also a section on spray materials. Control measures for the various diseases and pests are given in detail and the illustrations are very good.

Disorders of uncertain or complex origin.

(*See also* 5815–5817.)

6096. van Marle, G. S.
Bodemmoeheid in de fruitteelt; resultaten van een enquête in het rivierkleigebied. (**Soil sickness in fruit-growing: results from a survey in the river clay area.**)
Summary in *Tijdschr. PlZiekt.*, 1961, **67**: 61.

Among factors which appeared to have some effect on the occurrence of soil sickness were the previous fruit crop grown before replanting, the age of the old orchard and the type of rootstock. The interval before replanting (up to 5 years) had no effect. The significance of nematode populations was not clear, and poor growth was observed when numbers of *Pratylenchus penetrans* were relatively low.

6097. Hoestra, H.
Onderzoek over de herinplantingsprobleem in de fruitteelt. (**Studies on the replanting problem in fruit-growing.**)
Summary in *Tijdschr. PlZiekt.*, 1961, **67**: 61-2.

Pot tests with apple seedlings showed that, although nematodes are involved in the replanting problem, other factors are also important. *Pratylenchus penetrans* is the most prominent nematode involved.

6098. Oostenbrink, M., and Hoestra, H.
Nematode damage and "specific sickness" in *Rosa*, *Malus* and *Laburnum*. [Dutch summary 1 p.]
Tijdschr. PlZiekt., 1961, **67**: 264-72, bibl. 4, illus.

The injurious effects of *Pratylenchus penetrans* on roses, apples and laburnum were increased by previous cultivation of rye and potatoes on the same land. *Pratylenchus* damage was controlled by soil treatment with nematicides. The "specific sickness" [see *H.A.*, 26: 3538], which is not caused by nematodes, is now attributed to parasitic fungi. With laburnum the pathogen is thought to be *Ceratophorum setosum*. Specific sickness in roses was not reduced by a year's alternative cropping or fallow; it was controlled by nabam but not by DD. Field observations indicate the rose-sick soil may be infected with *Peronospora sparsa*. The causal agent of specific sickness on apples has not yet been found. Specific sickness is not common to all monoculture crops, and it may not be important in nurseries where rotation is practised, but it is likely to be of importance in orchards when replanting is done.—PlZiektDienst, and LandbHogesch., Wageningen.

6099. McIntosh, D. L.
The infection of pear rootlets by *Phytophthora cactorum*.
Plant Dis. Reptr, 1960, **44**: 262-4, bibl. 9, illus.

Isolation and inoculation tests with Bartlett pear trees, and with seedlings grown in nutrient solutions, provided considerable evidence that *Phytophthora cactorum* is a major factor in producing pear decline in bearing trees and in the failure of nursery stock in British Columbia. The addition of 6 p.p.m. of soluble Cu as Cheshunt compound to the solution in which inoculated seedling roots had developed lesions resulted in the production of healthy new secondary roots.—Res. Stat., Canada Dep. Agric., Summerland, B.C.

6100. Plock, H.
Das Marillensterben. **(Apricot decline.)**
Mitt. Klosterneuburg, *Ser. B*, 1960, **10B**: 19-21.

A discussion of the various possible causes of decline or apoplexy.

6101. Daines, R. H., and others.
Rusty spot of peach and its control in New Jersey.
Plant Dis. Reptr, 1960, **44**: 20-2, bibl. 1, illus.

Rusty spot of peach, which may be caused by a powdery mildew, was adequately controlled by sulphur fungicides applied at 8–10-day intervals from the shuck [calyx]-split stage. [See also *H.A.*, 30: 5143.]—N.J. agric. Exp. Stat., New Brunswick.

6102. Helton, A. W.
A genetic abnormality in an Idaho clone of *Fragaria vesca*.
Plant Dis. Reptr, 1960, **44**: 546-9, bibl. 9, illus.

Native strawberry plants which displayed prominent symptoms similar to, but less chlorotic than, those of leaf variegation in commercial varieties were collected and tested for symptom stability and virus content using standard greenhouse procedures. From these tests it was concluded that the abnormality was not infectious, under present definitions of the term, but was closely related to the described genetic leaf variegation conditions in commercial varieties, though more stable and more clonally uniform in effect than generally encountered elsewhere. [Author's summary.]—Univ. Idaho agric. Exp. Stat., Moscow.

6103. Miller, P. W.
Relative resistance of *Juglans regia* seedlings to infection by *Verticillium albo-atrum* as determined by inoculations.
Plant Dis. Reptr, 1960, **44**: 919, bibl. 3.

No infection occurred, indicating that the fungus is not the cause of decline.

Viruses.

(*See also* 7250, 7288.)

6104. Németh, M.
A gyümölcsfavírusok hazai előfordulása. **(The occurrence of fruit tree viruses in Hungary.)**
Reprint from *Kert. Szől.*, [1960], 9(6): 20.
A gyümölcsfák vírusbetegségei elleni védekezés lehetőségei. **(Possibilities of controlling virus diseases in fruit trees.)**
Mezőgazdasági Világirodalom, 1960, **2**(3): 85-96, bibl. 22.

The first paper is a general discussion, mentioning the use of indicator plants and the initiation of a certification programme. The second paper summarizes means of control by heat treatment, chemotherapy, cross protection, preventive measures and the provision of virus-free nursery stock.

6105. Cation, D.
Negative transmission of an apple virus through seeds.
Plant Dis. Reptr, 1960, **44**: 695, bibl. 2.

The virus or viruses causing the chlorotic leaf spot syndrome on Hyslop apple trees infected with the dwarf fruit virus were not transmitted by seeds.—Mich. St. Univ., East Lansing.

6106. Millikan, D. F., and Guengerich, H. W.
Further observations on the scar skin disease of apple.
Plant Dis. Reptr, 1960, **44**: 260-1, bibl, 2, illus.

Experiments with scions from healthy apple varieties grafted and fruited on a diseased tree indicated that several apple varieties are susceptible to the scar skin disease [apparently caused by a virus]. These include Red Delicious, Stark's Earliest, Red Gold, Stayman and Rome Beauty. Lodi, Minjon and Golden Delicious appear to be tolerant. Field observations indicated that Virginia Crab and Jonathan are susceptible to this disorder, and that Virginia Crab is a good indicator variety. [From authors' abstract. For earlier work see *H.A.*, 27: 2252.]

6107. Blodgett, E. C., and Aichele, M. D.
Evaluation of flowering crab and certain other apple clones for detecting stem pitting in apples.
Plant Dis. Reptr, 1960, **44**: 767-70, bibl. 13, illus.

Of 70 crab apple clones tested, Jay Darling, Purple Wave, Eleyi, Evelyn, Irene, Purple Lemoine, Red Silver and Van Eseltine were the best indicators for the stem pitting virus. Positive readings of tip die-back were available in 43 days.—Irrig. Exp. Stat., Prosser, Wash.

6108. Baumann, G.
Viruskrankheiten an Kirsche und Apfel und Massnahmen gegen ihre Ausbreitung. **(Virus diseases of cherry and apple and means of preventing their spread.)**
ErwObstb., 1961, **3**: 84-7, bibl. 5, illus.

Pfeffinger disease of sweet cherries, Stecklenberg disease of sour cherries, and the flat limb and proliferation diseases of apple are described and illustrated. The need for testing, and for the propagation of virus-free material, is discussed.

6109. Németh, M.
A gyümölcsfavirusbetegségek hazai terjedése. A meggy Stecklenbergi betegsége. **(The spread of fruit tree virus diseases in Hungary. The Stecklenberg disease of sour cherry.)**
Reprint from *Kert. Szől.*, [1960], **9**(8): 23-4, illus.

An illustrated description of symptoms, indicating that the disease is probably caused by a virus complex. Transmission occurs by grafting, through the soil, and apparently also by seeds. [See also *H.A.*, 31: 2195.]

6110. Cropley, R.
Viruses isolated from cherry trees with rasp-leaf and leaf-roll diseases.
From abstr. in *Ann. appl. Biol.*, 1961, **49**: 384.

Tests indicate that raspberry ringspot virus is the cause of rasp leaf of sweet cherries in most orchards, but arabis mosaic virus can cause a similar disease. Cherry leaf-roll virus is distinct from the arabis mosaic, raspberry ringspot, tomato black-ring, lettuce ringspot, tobacco ringspot and tomato ringspot viruses, but its reactions, behaviour and appearance are characteristic of a soil-borne "ringspot" virus.—E. Malling Res. Stat., Kent.

6111. Gualaccini, F.
Prove di inattivazione termica dell'agente virosico della "maculatura lineare" del ciliegio. **(Heat inactivation trials on cherry line pattern virus.)** [English summary ¾ p.]
Boll. Staz. Pat. veg., Roma, 1960, **18**: 31-47, bibl. 26.

Virus-infected Francia cherry shoots were subjected to various hot-water treatments and the buds were then grafted on wild cherry seedlings. Complete inactivation of the virus was obtained with treatment at 45-46° C. for 3 hours. Only 2 out of 10 plants were adversely affected by this treatment.

6112. Brooks, R. F.
Virus-vector studies of sour cherry viruses in Wisconsin.
Diss. Abstr., 1961, **21**: 2839, being *L.C. Card No. Mic.* 61-626 of 104 pp.

The results of insect transmission studies were negative.

6113. Wagnon, H. K., and others.
Observations on the passage of peach necrotic leaf spot and peach ring spot viruses through peach and nectarine seeds and their effects on the resulting seedlings.
Plant Dis. Reptr, 1960, **44**: 117-19, bibl. 6.

Observations based on seedling expression or on index plant reactions suggest seed transmission of both peach ring spot and peach necrotic leaf spot viruses.—Calif. Dep. Agric., Sacramento, and Agric. Res. Serv., U.S.D.A.

6114. Agrios, G. N.
Factors conducive to poor stock-scion union and virus-like symptom development in dwarf peach.
Diss. Abstr., 1961, **21**: 2848-9, being *L.C. Card No. Mic.* 61-434 of 127 pp.

Peach trees grafted on *Prunus besseyi* and *P. tomentosa* showed yellowing, reddening and curling of the leaves, followed by stunting and sometimes death of the trees. Foliage symptoms were associated with weakness and discolouration of the graft union, and longitudinal sections revealed a characteristic line of discoloured or dead tissue across all or most of the union area. Gum secretion at the union of peach on *P. tomentosa* was often observed. Virus studies showed that the presence of necrotic ring spot virus in the stock or scion at the time of budding interferes to some extent with the union of peach on peach, *P. besseyi* or *P. tomentosa*. The virus effect was evident only when either the stock or the scion carried the virus, and bud take was hardly affected when the virus was present in both stock and scion. Bud take of peach on peach was better in July than in August or September. Bud take of peach on *P. besseyi* and *P. tomentosa* in August was as good as that in

July. Budding in September gave poor stands on all 3 rootstocks. Bud take on *P. besseyi* was higher than that on *P. tomentosa*, but more peach trees showed incompatibility symptoms.—Ia St. Univ. Sci. Tech.

6115. Burnett, H. C.
Species of *Ficus* susceptible to the fig mosaic virus.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 316-20, bibl. 5, illus.

Symptoms on each of the following 7 susceptible species are described: *Ficus lucescens* (*F. wightiana*), *F. jacquinifolia*, *F. rubiginosa* (*F. australis*), *F. retusa* (*F. nitida*), *F. mallatocarpa*, *F. glomerata* and an unidentified species of *Ficus*.—St. Plant Bd Fla, Winter Haven.

6116. Tapio, E.
Vadelman virustaudit. **(Virus diseases of raspberries.)** [English summary 1 p.]
Valt. Maatalousk. Julk. **184**, 1961, pp. 21, bibl. 43, illus.

A survey of their occurrence in Finland and of insect vectors.

6117. Chambers, J.
The production and maintenance of virus-free raspberry plants.
J. hort. Sci., 1961, **36**: 48-54, bibl. 15.

Raspberry plants were freed from infection by some aphid-borne viruses by exposure for 2–3 weeks at temperatures around 35° C. More plants of Norfolk Giant and Malling Jewel were cured than of Lloyd George and Malling Promise, and the results suggest that aphid-borne raspberry viruses differ in their ability to multiply in plants at high temperatures. The methods used to propagate virus-free plants are described.—Scot, hort. Res. Inst., Invergowrie.

6118. Stace-Smith, R.
Studies on *Rubus* virus diseases in British Columbia. VII. Raspberry vein chlorosis.
Canad. J. Bot., 1961, **39**: 559-65, bibl. 8, illus.

A virus disease occurring in the raspberry variety Lloyd George has been identified as raspberry vein chlorosis, a disease previously reported from Scotland [*H.A.*, 22: 3583]. The virus was transmitted to Lloyd George and Washington raspberries, to loganberry and to the alpine strawberry (*Fragaria vesca*) by the aphid *Aphis idaei*. [For part VI see *H.A.*, 31: 490.]—Canada Dep. Agric., Vancouver, B.C.

6119. Pitcher, R. S., and Jha, A.
On the distribution and infectivity with arabis mosaic virus of a dagger nematode.
Plant Path., 1961, **10**: 67-71, bibl. 9.

Surveys carried out in the vicinity of 2 outbreaks of arabis mosaic virus in strawberries showed that there were relatively high populations of the virus vector (*Xiphinema diversicaudatum*) in hedgerows and woodlands. In nearby orchards and pastures the nematodes were rare or absent.—E. Malling Res. Stat., Kent.

6120. Miller, P. W.
Apparent inactivation of latent A strawberry virus in *Fragaria vesca* plants in preliminary tests.
Plant Dis. Reptr, 1960, **44**: 702-3, bibl. 3.

In preliminary greenhouse tests foliage applications of β-propiolactone at 4,000 to 8,000 p.p.m. appeared to have inactivated the latent A strawberry virus in 6·6% of the treated *F. vesca* plants.—U.S.D.A., Corvallis, Ore.

6121. Miller, P. W.
Rapid degeneration of some strawberry varieties and selected seedlings infected with latent C virus in combination with other viruses.
Plant Dis. Reptr, 1960, **44**: 796-9, bibl. 5, illus.

In most of the varieties and selections tested the latent C virus, when added to other viruses, caused more rapid and severe plant degeneration than any of the other viruses singly or in combination. However, a number of varieties, including Rockhill and Puget Beauty, and a number of selections were only mildly affected, indicating a degree of varietal tolerance to the latent C virus.—Agric. Res. Serv., U.S.D.A.

6122. Maassen, H.
Untersuchungen über ein von Erdbeeren isoliertes mechanisch übertragbares Nekrosevirus. **(Investigations on a mechanically transmissible necrosis virus isolated from strawberries.)** [English summary ½ p.]
Phytopath. Z., 1961, **41**: 271-82, bibl. 14, illus.

Isolation and properties; attempts to demonstrate transmission by insect vectors were unsuccessful.

6123. Durbin, R. D., Castillo, B. S., and King, T. H.
The occurrence of chlorogenic acid in strawberry plants affected with crinkle and yellows viruses.
Plant Dis. Reptr, 1960, **44**: 536-7, bibl. 9.

See *H.A.*, 31: 2202.

6124. Ciferri, R., and others.
"Panel" sulle virosi della vite. **(A symposium on vine virus diseases.)**
Not. Mal. Piante, 1961, No. 55, pp. 1-102.

A symposium is presented, consisting of 8 papers, 3 of which are abstracted separately. The other 5 (in Italian) are: (1) Salerno, M. Observations and trials on vine infective yellows in eastern Sicily (pp. 29–47, bibl. 11, illus.). (2) Prota, U. Infectious degeneration in the Cannonau variety. Part II. Appearance, succession and repetition of symptoms. Production of degenerated plants (pp. 53–67, bibl. 3, illus.). (3) Salerno, M. A contribution to the study of vine infectious degeneration in Sicily. II. The frequency of the macroscopic symptoms of the disease in some of the more important varieties of the Etna zone (pp. 69-94, bibl. 7, illus.). (4) Cosolo-Guissani, A. Field observations on the distribution and symptom expression of infectious degeneration of the vine in Friuli (pp. 95–8). (5) Graniti, A., and Ciccarone, A. Observations on virus and virus-like disorders of vines in Apulia (pp. 99–103, bibl. 7, illus.).

6125. Borzini, G., and Ceruti Scurti, J.
La degenerazione infettiva della vite in Piemonte. Risultati di ricerche preliminari ed orientamento delle indagini in corso. **(Vine infectious degeneration in Piedmont. Results of preliminary trials and objects of current investigations.)** [English summary 5 lines.]
Not. Mal. Piante, 1961, No. 55, pp. 19-27, bibl. 8.

Investigations on Barbera vines with different rootstocks suggest that the intensity of symptoms on the scions are progressively less with the rootstocks Rip. × Rup. 101/14, Berl. × Rip. 420A and Berl. × Rip. 157/11, in that order. It was found that nutrient deficiences, especially of B, can produce symptoms similar to infectious degeneration, and that NPK fertilization plus trace elements can sometimes mask important symptoms and improve health. Fertilization experiments continue.

6126. Rui, D.
Importanza di una esatta discriminazione dei caratteri sintomatologici comuni alla degenerazione infettiva ed alla borocarenza della vite. **(The importance of careful differentiation between the common symptoms of infectious degeneration and boron deficiency in the vine.)**
Not. Mal. Piante, 1961, No. 55, pp. 11-18, bibl. 1, illus.

These two disorders can be confused because their symptoms are very similar. The symptoms in shoots and buds differ in that, in B deficiency, the tip dies back and there is considerable secondary branching. The leaf symptoms in infectious degeneration include abnormalities of petiole and margin, laciniation and asymmetry of blade, curling, wrinkling, reduced size, infectious yellowing and mosaic. Those of B deficiency include discoloration, swelling. leatheriness, curling towards the base, marginal necrosis and partial early leaf fall.—Osserv. Mal. Piante, Verona.

6127. Ceruti Scurti, J.
Esami spettrofotometrici su viti affette da degenerazione infettiva. **(Spectrophotometric examination of vines affected with infectious degeneration.)** [English summary 9 lines.]
Not. Mal. Piante, 1961, No. 55, pp. 49-51, bibl. 9.

In investigations on healthy and diseased Barbera vines, and on 420A rootstocks on which infected Barbera scions had been grafted 6 months previously, the nucleic acid content of diseased leaves was found to be much greater than that of healthy leaves.—Ist. bot., Univ. Torino.

6128. Baldacci, E., and others.
Trasmissione su piante erbacee della virosi della vite nota come "degenerazione infettiva". **(Transmission to herbaceous plants of the vine virus known as "infectious degeneration".)** [French, English and German summaries 5 lines each.]
Reprint from *Ricerca sci.*, 1960, **30**: 981-3.

See *H.A.*, 31: 4211.

6129. Caudwell, A., and Poitou, N.
Interaction entre "court-noué" et "flavescence dorée". **(The interaction between vine infectious degeneration and flavescence dorée.)**
C.R. Acad. Agric. Fr., 1960, **46**: 958-63, bibl. 4.

Investigations on vines naturally infected with infectious degeneration indicated that the symptoms of flavescence dorée, viz. a proportion of non-ripened shoots, develop later in diseased than in healthy vines and are less severe. In vines artificially inoculated with flavescence dorée plus infectious degeneration the percentage of transmission of flavescence dorée was significantly lower than in vines inoculated with flavescence dorée alone. The percentage of infection by flavescence dorée was much lower in cuttings from parent material infected with infectious degeneration than from healthy material.

6130. Fogliani, G., and others.
Alcuni processi metabolici in viti sane e virosate. **(Some metabolic processes in healthy and virotic vines.)** [English, French and Portuguese summaries.]
Reprint from *Arq. port. Bioquim.*, 1959, **3**: 462-90, bibl. 48, illus.

A paper-chromatographic investigation was made of the effects of infectious chlorosis and/or urticado on various combinations of diseased and healthy scions and rootstocks. The content of most amino-acids was increased by each of the diseases separately but not by the combination. In Rupestris du Lot there was an increase of organic acids in the oxalic-tartaric zone and an absence of lactic acid with both diseases. In Fernão Pires there was a decrease in the oxalic-tartaric zone with each disease separately but not with the combination. With the combination in Fernão Pires there was an increase in citric acid, and the presence of lactic acid was observed. The disease caused no effects on the sugars examined.

6131. OCHS, G.
Über zwei Stämme und vier Varianten des Deformationsvirus (DV) der Weinrebe. **(Two strains and four variants of the fan leaf virus of the vine.)** [English and French summaries 8 lines each.]
Gartenbauwiss., 1960, **25**: 174-82, bibl. 24, illus.

The symptoms, detection and transmissibility by nematodes of the viruses causing fan leaf disease were investigated.

Bacteria.

(*See also* 6152.)

6132. ROOSJE, G. S., AND MEIJNEKE, C. A. R.
"Fire blight", een dreigend gevaar voor de Nederlandse fruitteelt? **(Is fire blight a threat to Dutch fruit growing?)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1961, **24**: 356-65, 385, bibl. 15, illus.

The climatic requirements of the bacteria are not fulfilled in the Netherlands during the main flowering period, although the disease is a danger for late-flowering pear varieties. Regulations for detecting and destroying any infections are listed. —I.P.O., and P.D., Wageningen.

6133. ARK, P. A., AND THOMPSON, J. P.
Hydrated lime improves Nuclay-streptomycin dust for pear blight control.
Plant Dis. Reptr, 1960, **44**: 204-5, bibl. 6.

The addition of 50% hydrated lime to a Nuclay-streptomycin dust increased its effectiveness for fire-blight control, and made it possible to use smaller quantities of the antibiotic at each application.—Univ. Calif., Berkeley.

6134. CAMERON, H. R.
Death of dormant buds in sweet cherry.
Plant Dis. Reptr, 1960, **44**: 139-43, bibl. 9, illus.

A death of dormant buds in sweet cherry is ascribed to a strain of *Pseudomonas syringae*. Symptoms on sweet cherry appear to be limited to a killing of dormant buds and do not seem to be associated with the formation of leaf spots or cankers. Bordeaux and Puratized Agricultural Spray were the most effective of 12 chemicals applied, for control.—Ore. agric. Exp. Stat., Corvallis.

6135. ARK, P. A., AND THOMPSON, J. P.
Experimental greenhouse control of crown gall and olive knot with antibiotic drenches.
Plant Dis. Reptr, 1960, **44**: 197-9, bibl. 10.

Woody types of crown gall (*Agrobacterium tumefaciens*) on apricot and peach, and olive knots (*Pseudomonas savastanoi*) were successfully controlled by antibiotic drenches consisting of streptomycin, terramycin or a combination of both in an iso-amyl-kerosene-lanoline-vaseline mixture. The drench was applied with a paint brush on intact galls. The galls were killed within 4 to 7 days in a warm greenhouse. [Authors' abstract.]—Univ. Calif., Berkeley.

6136. DAINES, R. H.
Dodine effective against bacterial spot of peach.
Plant Dis. Reptr, 1960, **44**: 826-7, bibl. 4.

Dodine at ¼, ½ and 1 lb., alone or with 1 lb. captan, all per 100 gal., was compared with captan at 2, 3 and 4 lb./100 gal. and with sulphur and zinc sulphate-lime for control of *Xanthomonas pruni* on peach trees. Sprays were applied to Sunhigh trees at 10-day intervals, beginning at the shuck [calyx]-split stage and continuing until harvest. Dodine at 1 lb. gave highly significant control of the disease, reducing the percentage of affected fruits to 9·4 compared with 29 for the zinc sulphate-lime treatment. No foliage injury resulted from the use of dodine, but a few fruits from trees sprayed at the 1 lb. level, and to a lesser extent at the ½ lb. level, showed yellow spots at harvest, but fruits showing this spotting averaged only 1% of the total for the 1 lb. dodine treatment.—Rutgers Univ., New Brunswick, N.J.

6137. DIENER, U. L., AND CARLTON, C. C.
Dodine-captan combination controls bacterial spot of peach.
Plant Dis. Reptr, 1960, **44**: 136-8, bibl. 1.

Dodine-captan combinations applied to Elberta peach trees significantly reduced bacterial spot (*Xanthomonas pruni*) by comparison with sulphur or captan applications. No phytotoxic effects of the combination spray were observed.—Agric. Exp. Stat., Auburn Univ., Ala.

6138. HUTTON, K. E.
Two common diseases of mulberries.
Agric. Gaz. N.S.W., 1961, **72**: 44-6, illus.

Symptoms of leaf spot (*Septogloeum mori*) and bacterial blight (*Pseudomonas mori*) are described, together with control recommendations.

Fungi.

(*See also* 5733, 5944-5946, 5971, 6073, 6099, 6101, 6216, 6218-6221, 7264, 7288.)

6139. BRAUN, H.
Die Kragenfäule des Apfels. **(Collar rot of apples.)**
ErwObstb., 1961, **3**: 81-4, illus.

See *H.A.*, 29: 2295 and 30: 417.

6140. WEBER, A.
Angreb af *Gloeosporium* i aebletræer. (Gloeosporium infection of apple trees.) [English summary ½ p.]
Horticultura, 1961, **15**: 156-9, illus.

A survey of the occurrence of *Gloeosporium* species in Denmark showed that both *G. album* and *G. perennans* are common on apple trees, even where 10 fungicidal sprays (copper/mercury) have been applied during the growing season.

6141. HICKEY, K. D.
The sooty blotch and fly speck diseases of apple with emphasis on variation within *Gloeodes pomigena* (Schw.) Colby.
Diss. Abstr., 1961, **21**: 1699-700, being *L.C. Card No Mic.* 60-5438 of 135 pp.

In spray experiments all the fungicides tested gave control of sooty blotch and fly speck provided the applications were repeated at intervals of one-half month or less. After the last spray application the fungicides could be separated into two groups based on their residual life in the control of sooty blotch and fly speck on apple fruits. Group 1 included captan, thiram and Niacide-Z, with a minimum period of 40 days between the last spray and the appearance of disease. Group 2 included zineb, Phaltan, ferbam, glyodin (at 1 qt. per 100 gal. of spray) and lead arsenate combined with captan; these fungicides were effective for 3 or more weeks longer than those in Group 1. [See also *H.A.*, 29: 251.]—Pa St. Univ.

6142. KEIL, H. A., AND WILSON, R. A.
Evaluation of fungicides for control of powdery mildew, as well as other diseases, of apple.
Plant Dis. Reptr, 1960, **44**: 253-5, bibl. 2.

Excellent to good control of powdery mildew on Rome Beauty apple trees was achieved without crop injury by 6 applications of the following amounts of fungicides in 100 gal. of water: 0·5 lb. of Karathane wettable dust (25%), 1 or 2 lb. of micronized wettable sulphur, 0·25 pint of Karathane liquid concentrate, 1·5 lb. of dodine (dodecylguanidine acetate), and a mixture of 0·25 lb. of Karathane w.d. and 0·5 lb. of dodine. For control of sooty blotch (*Gloeodes pomigena*) and flyspeck (*Leptothyrium pomi*) dodine was greatly superior to the other fungicides, and its control of scab was complete, the only disadvantage being that at 1·5 lb. per 100 gal. it caused an undesirable enlargement of the lenticels. The Karathane/dodine mixture showed high promise as a combined treatment against powdery mildew and scab. Nabac (methylene bis trichlorophenol) at 0·5 lb. per 100 gal. gave no control of any of these diseases. —Agric. Res. Serv., U.S.D.A., Beltsville, Md.

6143. MINISTRY OF AGRICULTURE, LONDON.
Apple powdery mildew.
Adv. Leafl. Minist. Agric., Lond. **205**, revised 1960, pp. 5, illus.

Control of *Podosphaera leucotricha* by a combined pruning and spraying programme.

6144. KIRBY, A. H. M., AND FRICK, E. L.
A glasshouse method for studying the effects of chemicals on the incidence of powdery mildews.
Reprint from *Meded. LandbHogesch. Gent*, 1960, **25**: 1215-20, bibl. 2.

Inoculation tests with spores of apple mildew (*Podosphaera leucotricha*) are described. The fungicidal activity of Karathane proved to be due to its phenolic, and not to its crotonic, component. This fungicide was slightly less effective, and no less phytotoxic, than its parent substance DNOP (2:4-dinitro-6-*sec*-octylphenol). With DNC, on the other hand, the toxicity to apple leaves was reduced by esterification. In general, 2:6-dinitrophenols were less phytotoxic than the corresponding 2:4 compounds, but 2:4-dinitro-l-fluorobenzene, as well as being harmless to apple leaves, gave greater protection than DNP against mildew, and was very effective *in vitro* against apple scab. The rootstocks MM.106 and MM.109 were equally susceptible to mildew infection, but the former was the much more responsive to protective treatments by all the compounds used. Actidione and its derivatives were not very satisfactory on apples, and another antibiotic, P. 189, was very unsatisfactory.—East Malling Res. Stat., Kent.

6145. BARNES, E. H., AND WILLIAMS, E. B.
A biochemical response of apple tissues to fungus infection.
Phytopathology, 1960, **50**: 844-6, bibl. 14.

A fluorescent phenolic compound, that increases in concentration in the peel of fruits and leaves of several apple varieties infected with either *Venturia inaequalis* or *Podosphaera leucotricha*, is considered to be a product of the host, not the parasite, since it is produced in response to 2 parasitic organisms, occurs in trace quantities in healthy tissues, and is not found in culture filtrates or mycelial extracts of *V. inaequalis*. [From authors' summary.]—Purdue Univ., Lafayette, Ind.

6146. PREECE, T. F., AND SMITH, L. P.
Apple scab infection weather in England and Wales, 1956-60.
Plant Path., 1961, **10**: 43-51, bibl. 7.

Investigations carried out at a network of centres in the principal apple growing regions of England and Wales have indicated that the occurrence of the main widespread meteorological conditions favouring spring infections can be determined equally well by observation of periods of high humidity after rain at standard weather stations, or by the observation of Mills periods using wetness recorders in representative orchards. The name "Smith periods" is used to designate the periods defined by the humidity criteria employed. [From authors' summary.]—Plant Path. Lab., Harpenden, and Met. Office, Harrow.

6147. Preece, T. F.
Spring rainfall and apple scab in England, 1915-60.
Plant Path., 1961, **10**: 52-3, bibl. 3.

From a study of rainfall records from 1915 to 1960 it appears that the total rainfall in April usually determines the severity of scab attacks in England. Many of the years with a wet April also have a wet May.—Plant Path. Lab., Harpenden.

6148. Harris, M. R.
Controlling apple scab in the orchard.
Bett. Fruit, 1961, **55**(8): 4, 6, 14.

With lime-sulphur, Cyprex and captan, and apple mildew with sulphur and Karathane.

6149. Powell, D.
The inhibitory effects of certain fungicide formulations to apple scab conidia.
Plant Dis. Reptr, 1960, **44**: 176-8.

Formulations of dodine, captan, Phaltan and Dyrene at 2,400 p.p.m. checked germination of conidia of apple scab for a 21-day period. At lower concentrations, however, a significant spore recovery occurred after 10 days. Dodine showed the greatest residual activity. Dichlone-treated spores revived completely after 10 days. Niacide M did not show a high spore inhibition initially but its effeet was persistent. Zineb was not effective. A captan-zineb mixture was as effective as captan alone; a captan-dodine mixture was slightly synergistic. Conidia were not released normally from the conidiophores when they were treated with either 50% captan or Phaltan 50W at 2,400 p.p.m. [For earlier work see *H.A.*, 29: 3417.]—Ill. agric. Exp. Stat., Urbana.

6150. Schicke, P.
Dodine (n-Dodecyl-guanidinacetat), ein organisches Schorffungizid mit kurativer Wirkung. **(Dodine, an organic scab fungicide with a curative action.)** [English summary ¼ p.]
Z. PflKrankh., 1961, **68**: 283-93, bibl. 23.

Dodine has given good scab control under German conditions when applied before infection at 0·075–0·05%, or after infection at 0·075–0·15%. The fungicide also inhibited the spread of powdery mildew to some extent. No foliar toxicity was observed, but russeting occurred on fruits of some varieties, and was sometimes aggravated by other conditions. Pear scab was also controlled by dodine.—Fa C.H. Boehringer Sohn, Ingelheim, Rhein.

6151. Soenen, A., and others.
La tavelure du pommier. *Venturia inaequalis* Ad. et *Fusicladium dendriticum* Fuck. **(Apple scab.)** [Flemish, English and German summaries ⅓ p. each.]
Rev. Agric., Brux., 1960, **13**: 821-53, bibl. 16, illus.

The curative or "stop-spraying" method of control is discussed.

6152. South Australia Department of Agriculture, Horticultural Branch.
Diseases of stone fruits.
J. Agric. S. Aust., 1961, **64**: 260-7, 271, illus.

Sclerotinia fruticola, *Rhizopus nigricans*, *Verticillium albo-atrum*, *Agrobacterium tumefaciens* and *Armillaria mellea.* [For part I see *H.A.*, 31: 4241.]

6153. Ogawa, J. M., and English, H.
Blossom blight and green fruit rot of almond, apricot and plum caused by *Botrytis cinerea.*
Plant Dis. Reptr, 1960, **44**: 265-8, bibl. 8, illus.

Susceptibility to blossom blight was high in almond varieties such as Ne Plus Ultra and Drake, with clustered flowers, and in the plum variety Santa Rosa. Infection of green apricot and almond fruits was via the withered floral parts. January and February applications of 10% N-phenylmercury-ethylenediamine, at 2·5 and 1 lb. per 100 gal. respectively, resulted in a very promising degree of control.—Univ. Calif., Davis.

6154. Keil, H. L.
Cherry leaf-spot and its control.
Leafl. U.S. Dep. Agric. **489**, 1961, pp. 5, illus.

Higginsia (*Coccomyces*) *hiemalis.*

6155. Graves, C. H., Jr., and Hurt, B. C., Jr.
Contact fungicides for peach scab control.
Plant Dis. Reptr, 1960, **44**: 129-31, bibl. 8.

One year of field testing indicated the possibility of controlling peach scab (*Fusicladium carpophilum*) with one dormant application of Puratized Apple Spray (phenyl mercury monoethanol ammonium acetate) at 2½ pints/100 gal. [From authors' summary. For earlier work see *H.A.*, 29: 3425.]—Miss. agric. Exp. Stat., St. Coll.

6156. Grosclaude, C., and de Latour, X.
Moyens de lutte contre la tavelure du pêcher. **(Means of controlling peach scab.)**
Pomol. franç., 1960, **2**(10): 9-10, 13, bibl. 3.

In a trial in Gironde in 1960 for the control of peach scab (*Megacladosporium* [*Fusicladium*] *carpophilum*) ziram at 250 g. per 100 l. water plus spreader was applied every 10 days up to 10 August beginning on 14 or 26 April or 6, 16 or 25 May. The incidence of scabby fruits (showing more than 10 patches each) was up to 10% with the first four starting dates, 24% with the 5th and 62% in the control. It is considered that spraying should begin when the sepals fall. The use of a spreader was important with pubescent but not with smooth-skinned peaches; the percentage of pubescent fruits with more than 10 patches was nil with ziram plus spreader and 44 with ziram only when spraying began at sepal fall, compared with 100 in the control.—Stat. Path. vég. Sud-Ouest, Pont-de-la-Maye.

6157. Turri, E.
Ulteriori prove sperimentali sull'impiego degli acuprici nella lotta contro la *Taphrina deformans* (Berk.) Tul. in provincia di Roma. **(Further experimental trials on the use of non-copper fungicides for the control of *Taphrina deformans* in Rome province.)** [English summary ½ p.]
Boll. Staz. Pat. veg., Roma, 1960, **18**: 79-92, bibl. 8.

Bordeaux mixture, Fermate, Cyprex and Phaltan were compared in 1959-60 for the control of peach leaf curl. On 20–21 November the bordeaux was applied at 3·0% and the others at 0·5%, and on 22 February the concentrations used were 0·7% and 0·3%, respectively. A spreader was added. Ferbam and Cyprex gave very good results. The mean percentages of infected leaves were 3·87 with bordeaux, 5·89 with Ferbam, 4·48 with Cyprex, 36·58 with Phaltan and 92·65 in the control. [For earlier work see *H.A.*, 30: 5141.]

6158. Heinis, J. L.
***Taphrina pruni-subcordatae* (Zeller) Mix, causing witches'-broom on Italian and French prunes.**
Plant Dis. Reptr, 1960, **44**: 630-1, bibl. 2.

No control was attempted, but cutting out and burning the brooms during pruning is considered practicable.

6159. Chiarappa, L.
Distribution and a mode of spread of *Cytospora* canker in an orchard of the President plum variety in California.
Plant Dis. Reptr, 1960, **44**: 612-16, bibl. 12, illus.

Cankers averaged 6·4 per tree, with the highest incidence on limbs exposed to the south. Young, 4–5-year-old trees were as severely diseased as older trees. Spore-infected pruning tools spread the disease and sun scald injuries allowed limb penetration of the fungus; hence it is thought possible to lower the incidence and spread of the disease by reducing sun scald injuries and disinfecting pruning tools.—Di Giorgio Fruit Corp., Calif.

6160. Cole, J. R.
Dodine, an outstanding fungicide for pecan scab control.
Plant Dis. Reptr, 1960, **44**: 251-2.

In a season of heavy infection by *Fusicladium effusum* 4 spray applications of 2% dodine (dodecyl-guanidine acetate 70%) resulted in a pecan nut yield of 88 lb. per tree with an average of 67 nuts per lb. The trees receiving only 2 applications averaged 41 lb. of nuts with 89 per lb., a markedly better result than those from 4 applications of either 4:1:100 bordeaux mixture, 2% ziram or 2% zineb. The untreated trees yielded an average of only 1 lb. of very small nuts. The extent of leaf infection 4 days after the first application was 34% on untreated trees, whereas the figures for treated trees were 22, 19, 17 and 4% for ziram, bordeaux mixture, zineb and dodine, respectively.—Agric. Res. Serv., U.S.D.A., Albany, Ga.

6161. Berry, F. H.
Etiology and control of walnut anthracnose.
Diss. Abstr., 1961, **21**: 2429-30, being *L.C. Card No. Mic.* 61-411 of 73 pp.

The fungus, *Gnomonia leptostyla*, overwinters primarily in fallen walnut leaves infected in the previous season. There were considerable variations in susceptibility to anthracnose among 40 walnut varieties tested, but when climatic conditions favoured fungus development even the less susceptible varieties became severely infected. In protective spraying experiments over 5 years zineb (Dithane Z-78) gave consistent and effective control. Other fungicides which were tested less extensively, but which also gave satisfactory control, were bordeaux mixture, Puratized Agricultural Spray, maneb (Dithane M-22) and dodine (Cyprex). Four applications of spray were necessary for anthracnose control, the first spray being applied when the leaves were ½–¾ full size. Dormant eradicant sprays reduced, but did not eliminate, the need for later protective sprays. In the Ohio variety anthracnose-affected trees produced an increasing percentage of nuts containing dark, shrivelled kernels as the degree of defoliation increased. In an orchard of Stabler walnuts the crop was so light that premature defoliation did not appear to affect nut quality. [For earlier work see *H.A.*, 29: 2316.]—Univ. Md.

6162. Zuckerman, B. M.
Studies of two blueberry stem diseases recently found in eastern Massachusetts.
Plant Dis. Reptr, 1960, **44**: 409-15, bibl. 7, illus.

Blueberry cankers caused by *Coryneum microstictum* and *Fusicoccum putrefaciens* are described, the latter for the first time. Spring applications of ferbam, ziram or an organic mercurial fungicide were ineffective against both diseases. Special pruning treatments aimed at controlling *C. microstictum* are in progress.—Cranberry Exp. Stat., Univ. Mass., East Wareham.

6163. MÜLLER, H. W. K.
Zur Bekämpfung des Grauschimmels *Botrytis cinerea* Pers. an Erdbeeren. **(Control of grey mould, *Botrytis cinerea*, on strawberries.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1961, **13**: 65-8, bibl. 11, illus.

In 1960 a severe botrytis infection was controlled with two thiram (TMTD) sprays at the beginning and end of flowering. A third spray during fruiting was not required. A large application, 2,400 l. of a 0·2% solution per ha. (= 4·8 kg. TMTD/ha.), is recommended.—Staatsinst. angew. Bot., PflSchutzamt, Hamburg.

6164. CONVERSE, R. H.
Control of *Phytophthora fragariae* with soil fungicides.
Plant Dis. Reptr, 1960, **44**: 948-51, bibl. 7.

In field tests soil fumigation with Trizone (propargyl bromide + methyl bromide + chloropicrin) at 51 gal. per acre reduced the percentage of strawberry plants showing red stele symptoms from 94 in the control to 9·3. Vapam at 49 gal./acre and Dowfume MC-2 (methyl bromide + chloropicrin) at 892 lb. per acre reduced the disease but were less effective.—Agric. Res. Serv., U.S.D.A.

6165. PERIES, O. S.
Overwintering of *Sphaerotheca humuli* on strawberry plants.
Plant Path., 1961, **10**: 65-6, bibl. 2.

The mycelium was found to survive in green overwintering leaves.

6166. ABLAKATOVA, A. A.
A new disease on vines. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(7): 27.

In the Primorsk region of the U.S.S.R. a new disease on vines caused serious damage in 1958–59. The leaves of infected vines exhibit small cinnamon-coloured spots during July; these spots later develop small white dots and the centres become light grey. The leaves fall prematurely. The causal fungus was identified as *Aureobasidium vitis*. Quarantine measures are recommended.

6167. HILLEBRAND, W., AND KADISH, E.
Versuchsergebnisse über die Bekämpfung der *Botrytis* aus dem Jahre 1960. **(Results of trials on *Botrytis* control in 1960.)**
Weinberg u. Keller, 1961, **8**: 111-14, bibl. 4.

Müller-Thurgau and Riesling vines were dusted on 26 August and, following heavy rain, again on 2 September with captan at 32 kg./ha., Ortho-Phaltan at 36 kg/ha. and copper-sulphur powder at 40 kg./ha. Captan gave 70–85%, Ortho-Phaltan 50–80% but copper-sulphur only about 10% reduction of attack over the controls. Neither fermentation nor quality of the wine was affected by the dusts.—Landeslehr- u. Versuchsanst. Weinb. Gartenb. Landw., Bad Kreuznach.

6168. STELLWAAG-KITTLER, F.
Neue Versuchsergebnisse zur Bekämpfung der Stiel- und Beerenfäule (*Botrytis*) im Weinbau. **(New experimental results on the control of stem and fruit rot in viticulture.)**
Dtsch. Weinb., 1960, **15**: 621-7, from abstract in *Z. PflKrankh.*, 1961, **68**: 305.

While *Botrytis* control by chemicals is not possible, infection can be reduced to some extent by avoiding wounds on the plant (caterpillar control), by reducing the humidity of the microclimate round the vines (cultivation and weed control), and by reducing physiological susceptibility to the disease. Fungicides applied for *Peronospora* control which are fungistatic to *Botrytis* are captan, DPTD, TMTD and Ortho-Phaltan. Zineb, maneb, ferbam and Thimet are not inhibitory to *Botrytis*.

6169. GRANITI, A.
Prove di lotta contro la *Peronospora* della vite in Puglia con trattamenti polverulenti di zineb. **(Trials with zineb dust treatments for the control of vine downy mildew in Apulia.)** [English summary ½ p.]
Not. Mal. Piante, 1960, No. 53/54, pp. 255-67, bibl. 2.

In trials in 1958 and 1959 zineb dust and alternating applications of zineb dust and zineb spray proved slightly inferior to zineb spray throughout the season for the control of vine downy mildew (*Plasmopara viticola*). In other trials the normal series of sprays of zineb at 0·25% was amended by substituting for the 2 sprays during flowering and fruit set in the first half of June 2 dust treatments, each consisting either of 2·5% zineb plus 97·5% sulphur or 10% copper oxychloride (Caffaro) plus 90% sulphur; both schedules gave good control on fruits and leaves and caused no injury to flowers.—Ist. Pat. veg., Univ. Bari.

6170. GRANITI, A., AND LAVIOLA, C.
Prove di confronto di alcuni anticrittogamici nella lotta contro la *Peronospora* primaverile e autunnale della vite in Puglia. **(Comparative trials with some fungicides for the spring and autumn control of vine downy mildew in Apulia.)** [English summary ¾ p.]
Not. Mal. Piante, 1960, No. 53/54, pp. 269-84, bibl. 14, illus.

In trials on Regina vines 5 non-copper fungicides, alone or in mixture, were compared with 1% bordeaux mixture for the spring control of vine downy mildew (*Plasmopara viticola*), 11 applications being made between 20 April and 16 July. Four treatments were equally successful, viz. (1) 66% zineb at 0·25%; (2) 50% zineb plus 40% ziram at 0·3%; (3) 50% zineb plus 50% colloidal sulphur at 0·3%; and (4) 30% zineb plus 27% captan at 0·275%; 90% ziram alone was unsatisfactory. These non-copper products did not have the prolonged residual effect of bordeaux mixture and two further applications were required at the end of August. With bordeaux mixture the two autumn treatments were unnecessary.—Ist. Pat. veg., Univ. Bari.

6171. Baldacci, E.
Sull'inefficacia della poltiglia bordolese nella lotta antioidica. **(The ineffectiveness of bordeaux mixture for control of vine powdery mildew.)**
Riv. Vitic. Enol., 1961, **14**: 107-11, bibl. 3, illus.

Neither 0·2% zineb nor 1% bordeaux mixture, applied 6 times from early May to mid-August, prevented the incidence and spread of *Uncinula necator* on the susceptible vine variety Italian Riesling, but in each case excellent control was achieved by additional treatments with re-sublimed sulphur. The addition of 0·3% wettable sulphur to the zineb greatly reduced the severity of the infection.—Univ. Milano.

Nematodes.

(*See also* 6096-6098, 6119.)

6172. Lownsbery, B. F.
Factors affecting population levels of *Criconemoides xenoplax.*
Phytopathology, 1961, **51**: 101-3, bibl. 13.

Lovell and S–37 peach seedlings and Thompson Seedless vine cuttings were grown in pots. The vine is a good, and the peaches are poor, hosts for the nematode. A soil temperature of 26° C. favoured an increase in the nematode numbers more than temperatures of 13°, 18°, 21° and 28° C. With peach no difference in the nematode population was noted between soils of pH 5 and pH 7. In the pots peach seedlings were not injured by nematode levels as high as any yet found in Californian peach orchards. [See also *H.A.*, 31: 2248.]—Univ. Calif., Davis.

6173. Zuckerman, B. M.
Parasitism and pathogenesis of the cultivated cranberry by some nematodes. [French summary 7 lines.]
Nematologica, 1961, **6**: 135-43, bibl. 10, illus.

Studies of nematode parasitism showed that infestation by *Trichodorus christiei* caused a significant reduction in growth of cranberry cuttings and seedlings. The feeding of *Hemicycliophora similis* caused a consistent reduction in seedling growth, but the growth of potted cuttings was not greatly reduced.—Cranberry Exp. Stat., Univ. Mass.

6174. (Trought, T. E. T., and Heath, E. D.)
Strawberry growth stimulation with DD.
Comm. Gr, 1961, No. 3417, p. 1467.

In a small trial pre-planting fumigation of the soil with DD at 400 lb./acre improved growth and runner production of strawberries, and appeared to give more than 98% control of *Xiphinema diversicaudatum*.

Mites.

(*See also* 6197, 6201, 6219, 6224, 6229, 7288.)

6175. Gaprindašvili, N. K., and Novickaja, T. N.
The preservation of beneficial predatory mites during the chemical treatment of fruit plantings in Georgia.
Agrobiologija, 1961, No. 1, pp. 114-21, bibl. 12.

The main species of phytophagous mites and predatory species found in apple orchards in Kartli are listed. Frequent spraying with DDT was found to destroy the predatory species, as a result of which the population of phytophagous mites rapidly increased. Spraying with ethyl sulphonate was found to be unprofitable, as, although it was toxic to phytophagous mites, its activity was very short-lived and the remaining mites quickly multiplied. The use of Paris Green instead of DDT is recommended where appropriate.

6176. Bognár, S.
A takácsatkak elleni védekezés gyümölcsösben. **(Spider mite control in orchards.)**
Mezőgazdasági Világirodalom, 1960, **2**(3): 78-85, bibl. 22.

Six species, synonyms, life histories, effective acaricides and times of application [see also next abstract and *H.A.*, 31: 533].

6177. Bognár, S.
Megfigyelések a gyümölcsfákon élő takácsatkafajok populációs dīnamikáját befolyásoló tényezőkkel kapcsolatban, különös tekintettel a DDT tartalmú készítményekre. **(Observations on the effect of various factors on the dynamics of spider mite populations, with special reference to DDT preparations.)** [English and Russian summaries ¾ p. each.]
Kísérl. Közlem., Sect. C, 1960, **53C**(1): 19-32, bibl. 17.

Of spider mites occurring in Hungarian apple orchards the following 6 species have been identified: *Bryobia praetiosa*, *B. redikorzevi*, *Schizotetranychus* (*Eotetranychus*) *carpini*, *Panonychus ulmi*, *Tetranychus viennensis* and *T. telarius* [see also *H.A.*, 31: 533]. Low R.H. (35–55%), high temperatures (28–31° C.) and photoperiods of 14–16 hours were found to favour the build-up of mite populations. In addition to ecological factors, the use in orchards of insecticides containing DDT or methyl parathion increased infestations.

6178. Müller, E. W.
Vierjährige Freilandversuche zur Bekämpfung der Obstbaumspinnmilbe *Metatetranychus ulmi* Koch. (Tetranychidae, Acari). **(Four-year field trials on the control of fruit tree red spider mite.)** [Russian and English summaries 10 lines each.]
NachrBl. dtsch. PflSchDienst, Berlin, 1961, **15**: 34-8, bibl. 20, illus.

During 1956-59 experiments on the control of red spider mite were carried out in apple orchards with 7 acaricides officially recognized in East Germany. Three successive applications, beginning during blossoming, gave effective control with all the preparations tested. A rotation in the use of the various active ingredients is desirable to avoid a build-up in mite resistance.—Biol. Zentralanst., Berlin.

6179. Mallach, N.
Die Zwetschenmilbe in Baumschulen. **(The plum mite in the nursery.)**
ErwObstb., 1961, **3**: 87-8, bibl. 5, illus.

Czar, Hauszwetsche, Wangenheim, Oullins and greengage were badly infested by *Phyllocoptes* mites in Bavaria, whereas *Prunus cerasifera* and *P. pissardii* were immune to attack. A 1% solution in summer or a 3% solution in winter of the preparation Solbar is recommended as a spray. Organic phosphorus insecticides have also given good results.

6180. Legowski, T. J.
New controls for redberry disease.
Grower, 1961, **55**: 888-9, illus.

Trials in commercial blackberry plantations showed that effective control of the mite *Aceria essigi*, causing redberry disease, was not obtained by lime-sulphur applied once in late April. Endrin applied before flowering gave better results in a year of light infestation, but was disappointing when infestations were heavy.

6181. Collingwood, C. A., and Brock, A. M.
Aspects of black currant gall mite infestations.
Ann. appl. Biol., 1961, **49**: 211-15, bibl. 7.

The greatest invasion of mites onto insect-free plants takes place between blossom and setting. Thus the presently recommended spray programme of one application as the first flower opens, followed by another 3 weeks later, is adequate. Once bushes have become mite-infested to the extent of 12% or more of the buds being galled there seems no prospect of rehabilitation by chemical spraying, and cropping is likely to decline to uneconomic levels after about 2 seasons owing to the irreversible development of reversion. Previous reports [*H.A.*, 30: 5173 and 31: 2262] showed that pre-blossom applications of lime-sulphur or endrin held existing infestations at about the same level, and that post-blossom sprays of endrin or fluoroacetamide were necessary to reduce the infestation.—N.A.A.S., S.-W. and E. Midland Regs.

6182. von Horn, A.
Die Bekämpfung der Johannisbeergallmilbe. **(Control of the black currant gall mite.)**
ErwObstb., 1961, **3**: 65-6.

A 1% solution of a preparation containing 25% endrin, 0·1% Metasystox mixed with 0·035% E 605f, and 1% wettable sulphur were compared in trials. Endrin applied twice (once during and once after hatching of the mites) was the best, reducing the incidence of big bud to about 15% of that in the controls.

6183. Mathys, G., and Hügi, H.
L'érinose de la vigne (*Eriophyes vitis* Pgst.) **(Damage to vines by *Phytoptus vitis*.)**
Rev. romande Agric. Vitic., 1961, **17**: 29-30, bibl. 2, illus.

The best of 4 winter treatments applied on 23 March were dinitrocarbolineum (5% of leaves attacked on 9 May) and 8% lime-sulphur (7·5% attacked). All the 8 products applied in spring (2 May) gave appreciable control, the best being 0·2% thiodan and 0·1% phenkapton plus 0·1% parathion. Of summer treatments applied on 5 and 13 August the best results (on 20 August) were given by 0·15% Kelthane, 0·1% phenkapton and 0·5% wettable sulphur. Winter treatment is recommended in preference to spring treatment, and should be applied shortly after the buds begin to swell. Summer spraying and dusting are only temporary palliative measures.—Stats féd. Essais agric., Lausanne.

Insect pests.

(*See also* 6219, 6224, 6225, 6229, 6231, 6285, 6806, 7264, 7288.)

6184. Foschi, S.
Nuovi indirizzi fitosanitari in frutticoltura. **(New recommendations for plant protection in fruit culture.)**
Riv. Ortoflorofruttic. ital., 1961, **45**: 71-6, illus.

After discussing changes in the incidence of San José scale (*Aspidiotus perniciosus*), *Psylla pyricola*, red spider mite and *Cydia molesta*, the author makes the following recommendations for control of these pests: (1) for apple (except the Commercio variety) continue to use calcium polysulphide (6 Bè) when the buds are swelling or, if application is made later, 6–7% barium polysulphide plus, possibly, parathion for the control of aphids' eggs; (2) for peach apply 6% barium polysulphide plus parathion when the buds are swelling; (3) for pear, where psylla damage is fairly considerable, apply 5% miscible tar oil plus 6–7% barium polysulphide or parathion plus barium polysulphide when the buds are swelling.

6185. HOYT, S. C., AND MADSEN, H. F.
Dispersal behavior of the first instar nymphs of the woolly apple aphid.
Hilgardia, 1960, **30**: 267-99, bibl. 18, illus.

The seasonal and daily movements of *Eriosoma lanigerum* up and down the trunks of Yellow Newtown Pippin trees, and the effects of temperature, light and other factors on these movements, are described with a view to preventing entry of the aphids into the apple cores. Entry into the cores was considered to be accidental rather than due to any attraction.

6186. LLOYD, N. C.
Control of the black peach aphid (*Anuraphis persicae-niger*).
Agric. Gaz, N.S.W., 1961, **72**: 73-4, illus.

DDT 0·1% emulsion is recommended for the routine pre-budburst spray. If reinfestation occurs when the trees are in leaf and green peach aphid is also present, the systemic materials Metaisosystox, Ekatin or Sayfos may be used.

6187. MINISTRY OF AGRICULTURE, LONDON.
Currant and gooseberry aphids.
Adv. Leafl. Minist. Agric., Lond., **176**, revised 1961, pp. 5.

Brief notes on 7 species and recommended control in winter with tar oil and in spring with DDT, malathion, endrin and demeton-methyl.

6188. KIRJUHIN, G. A., VAJNŠTEJN, M. M., AND ORLOVA, L. V.
Some cultural practices promoting the re-establishment of vineyards affected by phylloxera. [Russian.]
Vinodelie i Vinogradarstvo, 1961, **21**(2): 33-5.

Deep cultivation of the soil in the inter-rows to a depth of 50–60 cm. in September–October, combined with foliar applications of NPK and micro-elements and with sterilization of the soil using dichlorethane (3 tons/ha.) applied 4 times in 2 years, resulted in an average annual yield of 75 centners/ha. over the following 6 years. The sugar content of the berries was increased by 3–4%.

6189. JOHNSON, W. T.
Control of chestnut weevils.
51st A.R. north. Nut Grs' Ass., 1960, pp. 51-2.

The soil or ground cover should be sprayed with heptachlor or aldrin at 3 lb. a.i. per acre 1 week after the catkins begin to bloom and again about 1 August. If the chestnut planting borders a woodland, foliage spraying will be necessary. With high pressure sprayers 3–4 foliage sprays of 4 lb. 50% DDT w.p. in 100 gal. at weekly intervals from 15 August have proved effective.—Univ. Md, College Park.

6190. STOLJAROV, M. V.
***Isophya redtenbacheri* in Georgia.** [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(8): 36-7, illus.

The cricket *I. redtenbacheri* feeds on more than 40 different plants, but shows a marked preference for woody plants including walnuts. In 1959 the pest reached serious proportions in Adžaria, and attacked annual crops as well as apples, pears, plums and walnuts. A DDT aerosol spray in mid-June, at the time of mass feeding, resulted in 53% mortality. Dusting with 12% BHC at the beginning of July gave 96% kill of the adults.

6191. BAGGIOLINI, M.
La mouche scorpion (*Panorpa communis* L.) peut s'attaquer aux pêches mûres. **(*Panorpa communis* can attack ripe peaches.)**
Rev. romande Agric. Vitic., 1961, **17**: 30-2, bibl. 4, illus.

A description is given of the pest and the injury caused. The placing of one trap containing 3% biammonium phosphate per tree reduced the incidence of injured peaches to 5% compared with 20% in the control.—Stats féd. Essais agric., Lausanne.

6192. ZNAMENSKIĬ, V. S.
Pistachio seed-eaters. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(8): 33-4, illus.

Of the 16 pests found in pistachio plantations in south-eastern Turkmenia, the most injurious are *Eurytoma plotnikovi* and *Megastigmus pistaciae* which feed on the kernels. *E. plotnikovi* usually causes a 16–20% reduction in yield and in severely infested districts the loss may amount to 93%. *M. pistaciae* usually causes a 5·5% loss in yield. The only effective control measure is the application of 5·5% DDT dust against the adults. This should be applied in mid-May for control of *E. plotnikovi*, and at the end of April to the beginning of May, and again at the end of June to the beginning of July, for control of *M. pistaciae*, which has 2 generations.

6193. JOHNSON, W. T.
Insects affecting nut tree crops.
50th A.R. north. Nut Grs' Ass., 1959, pp. 39-44, bibl. 10, illus.
Observations and experiments on husk flies of eastern black walnut in Maryland.
51st A.R. north. Nut Grs' Ass., 1960, pp. 84-7, bibl. 5.

The chief insect pest of walnuts, the husk fly (*Rhagoletis suavis*), can be controlled by spraying with 1 quart of Staley's protein insecticide bait and 4 lb. 25% w.p. malathion in 100 gal. water per acre between 20 August and 20 September. A post-blossom spray of methoxychlor w.p. was effective against the weevils *Conotrachelus retentus* and *C. juglandis*, and malathion controlled the larvae of *Datana integerrima* on walnuts. For weevils on hickory and pecan a foliar spray of DDT is recommended.—Univ. Md, College Park.

6194. Nikolaeva, E. D.
Stephanitis pyri G. [Russian.]
Sadovodstvo, 1961, No. 4, pp. 26-7.

Stephanitis pyri attacks pears, apples and many other fruit crops. In laboratory and orchard trials insecticides which gave good control included DDT, aldrin, heptachlor, Metafos (parathion + methyl parathion) and BHC applied after harvest.

6195. Raine, J., and Tonks, N. V.
Control of three species of leafhoppers on *Rubus* in British Columbia.
Proc. ent. Soc. B.C., 1960, **57**: 23-6, from *Biol. Abstr., Sect. E*, 1961, **36**, Abstr. 42693.

One application of Trithion controlled *Ribautiana tenerrima*, *Edwardsiana rosae* (both Typhlocybinae) and *Macropsis fuscula*. Malathion, diazinon, Sevin, methoxychlor and Guthion controlled *M. fuscula* and first generation Typhlocybinae, but not the second generation. DDT controlled both generations of Typhlocybinae, but not *M. fuscula*. Dimethoate, phorate, endrin and Phosdrin, tested against first generation Typhlocybinae only, were effective. Systox reduced both generations. Dimethoate applied as a drench to the crowns in April controlled *M. fuscula* and first generation Typhlocybinae.—Canada Dep. Agric., Vancouver.

6196. Bognár, S.
Az almamoly elleni vegyi védekezés fejlődése. **(The development of the chemical control of codling moth.)**
Növénytermelés, 1961, **10**: 179-82, bibl. 39.

A brief review of the literature.

6197. Bognár, S.
Az almafa komplex védelmének ízeltlábú kártevőkkel kapcsolatos problémái, különös tekintettel az almamolyra. **(Problems of the complex protection of apple trees against arthropod pests, with special reference to codling moth.)** [English and Russian summaries 1 and ½ p. respectively.]
Kisérl. Közlem., Sect. C, 1960, **53C**(1): 73-92, bibl. 23.

Experiments were conducted over 4 seasons on the control of insects and spider mites on apples with some newer organics. The use and regular inspection of band traps proved suitable for following the development of codling moth and timing treatments accordingly. Of the spray schedules used those containing Pernit (DDT) were consistently the best, although a reduction in the effectivness of the material was noted. The combinations Defusit + Pernit and Cosan (wettable sulphur) + Pernit were the most effective. Pernit + Wofatox (methyl-parathion) encouraged spider mite build-up, and Pernit alone increased populations of spider mite, woolly aphid and San José scale.

6198. Marshall, J., and Williams, K.
An experiment in controlling DDT-resistant codling moth, *Carpocapsa pomonella* L.
Proc. ent. Soc. B.C., 1960, **57**: 9-12, from *Biol. Abstr., Sect. E*, 1961, **36**, Abstr. 42689.

Five cover sprays of Sevin 50% w.p., 6 lb. acre, or ethion 25% w.p., 12 lb. acre, gave good control of the codling moth, Sevin being the more effective. DDT 50% w.p., 12 lb./acre, gave very poor control. Sevin gave adequate control of the green aphid, *Aphis pomi*, but resulted in a heavy infestation of the mite *Tetranychus mcdanieli*. Ethion had the opposite effect but caused some defoliation of Delicious apple trees a month before harvest. Harvest residues on apples were: Sevin 0·8 p.p.m., DDT 3·3 p.p.m.—Canada Dep. Agric., Summerland.

6199. Madsen, H. F., and Falcon, L. A.
DDT-resistant codling moths on pears in California.
J. econ. Ent., 1960, **53**: 1083-5, bibl. 4.

DDT, DDT + parathion and parathion alone all gave poor control of codling moth on pears. Guthion and Ethyl Guthion at 1½ lb. per 100 gal. gave very good control, and when the rate was reduced to ¾ lb. there was a significant increase in infestation in one trial but not in another. An emulsion concentrate formulation was not as effective as the wettable powder. Of the other materials used Sevin provided good control, and diazinon was effective when applied at 2-week intervals, but was not satisfactory when compared with Sevin and Guthion in a standard spray schedule.—Univ. Calif., Berkeley.

6200. Il'in, I. G.
The use of *Trichogramma* in the Vinecki region. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(7): 25-6, illus.

When *Trichogramma* spp. were released at the time of oviposition of the pests it was found that they parasitized 95–100% of the eggs of cutworm [*Agrotis* spp.] and 50–75% of the eggs of codling moth [*Enarmonia pomonella*]. *Trichogramma evanescens* was used against caterpillars [unspecified] on cabbage and *T. cacoecia pallida* against the codling moth. The infestations in the parasitized district were 3–4 times less than that in the control districts. When parasites are released DDT must not be used as it kills the larvae and adults.

6201. Lloyd, N. C.
Codling moth (*Cydia pomonella*).
Agric. Gaz. N.S.W., 1961, **72**: 96-100, illus.

Preventive measures for the control of codling moth, light brown apple moth (*Tortrix postvittana*) and red spider mite (*Tetranychus telarius*) on apples and pears are described. [See also *H.A.*, 31: 569 and 570.]

6202. JENKINS, C. F. H.
Light brown apple moth.
J. Agric. W. Aust., 1961, **2**: 85-6.

Life cycle, damage caused and control using 2 lb. Gusathion 25% w.p. plus 1 gal. superior summer oil per 100 gal., or 2 lb. Sevin 50% w.p. plus 1 gal. superior summer oil per 100 gal.

6203. BAGGIOLINI, M.
Observations sur la biologie de deux mineuses du genre *Lithocolletis: L. corylifoliella* et *L. blancardella* (Lep. Gracilariidae), nuisibles aux arbres fruitiers en Suisse romande. **(Observations on the biology of two leaf miners, *Lithocolletis corylifoliella* and *L. blancardella* (Lepidoptera—Gracilariidae), harmful to fruit trees in the French-speaking parts of Switzerland.)**
Reprinted from *Bull. Soc. ent. suisse*, 1959, **32**: 385-97, bibl. 19, illus., as *Publ. Stats féd. Ess. agric., Lausanne*, **612**, 1960.

Control of these 2 pests can be combined with that of the more prevalent miner, *Lyonetia clerkella*, if the trees (mainly apple) are sprayed with insecticides immediately after flowering.

6204. FALANGHE, O., NETTO, N. D., AND ARAÚJO, J. B. M.
Combate à mariposa oriental das frutas, *Grapholitha molesta* (Busck), em marmeleiros. **(Control of the oriental fruit moth, *Cydia molesta*, on quince.)** [English summary ½ p.]
Arq. Inst. biol., S. Paulo, 1959, **26**: 89-101, bibl. 16.

In a comparison of 5 insecticides on Portugal quinces 1% DDT sprays gave the best results, namely, 89% reduction in infested fruits compared with the controls, and the greatest number and weight of healthy fruits. Spraying should start at the beginning of the growth flush, and a minimum of 8 applications should be made at intervals of 10–15 days.

6205. SNAPP, O. I.
Treatment of peach nursery stock to prevent infestation by the peach tree borer.
J. econ. Ent., 1961, **54**: 400.

Trunk sprays of DDT applied 4 times gave complete control of *Sanninoidea exitiosa*, dieldrin used once good control and parathion 3 times fair control.—U.S.D.A., Beltsville, Md.

6206. TOMLINSON, W. E., JR.
Control of the cranberry fruitworm, *Acrobasis vaccinii*.
J. econ. Ent., 1960, **53**: 1116-19, bibl. 6, illus.

Flooding was the only reliable treatment known against cranberry fruitworm until 1937, when it was found that rotenone gave effective control. Since 1953 tests have been made with many insecticides. Several organic phosphates and Sevin, thiodan and rotenone applied as high volume sprays and parathion and Trithion applied as semi-concentrate sprays were very satisfactory. All the phosphates exhibited ovicidal action, and several systemics, when applied as concentrates, killed significant numbers of larvae feeding in the fruit. [From author's abstract.]—Mass. agric. Exp. Stat., E. Wareham.

6207. SAVZDARG, V. É.
How to control the gooseberry pyralid. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(8): 42.

The gooseberry pyralid moth is a very injurious pest of gooseberries and currants. It overwinters in its pupal stage in the soil, and in early spring the adults lay eggs mainly on early varieties. When the infestation is slight, dusting with 5·5% DDT at 35–40 kg./ha. or spraying with 30% DDT suspension immediately after flowering will give good results. If the infestation is more severe, the treatment must be repeated 10–12 days later. In heavily infested districts the soil around the bushes can be dusted with 12% BHC, at about 50–60 g. per bush, 7–8 days before flowering, but this treatment may cause an off-flavour in the fruit.

6208. LHOSTE, J., AND BONNET, R.
Sur l'efficacité du Sevin dans la lutte contre les tordeuses de la grappe effectuée en 1960. **(On the efficiency of Sevin in the control of vine tortrix moths in 1960.)**
Progr. agric. vitic., 1961. **155**: 143-7, 171-3.

Using DDT and parathion as standards, Sevin and Phosdrin were compared for the control of *Cochylis* sp. and *Eudemis* sp. Sevin gave almost as good and persistent control as DDT or parathion, and was less toxic to the plants than parathion.

6209. SANSAVINI, S., AND BORTOLOTTI, E.
Prove di trattamenti invernali-primaverili contro la psilla del pero. **(Trials on the winter and spring control of pear psylla.)**
Inf. fitopat., 1961, **11**: 60-5, illus.

In trials in Ferrara in 1960 no treatment was fully successful against *Psylla pyri* because of the long period of oviposition. The dates of application did not seem to affect results greatly. For winter application tar oils plus polysulphide and yellow oils gave the best results. For spring treatment white oils plus thiodan or methyl parathion were most successful. Whatever the winter treatment, it is necessary to follow it with a spring treatment.

6210. (BURTS, E. C., KELLY, S. G., AND BRUNSON, M.)
Pre-bloom spray essential for good control of pear psylla, WSU researchers discover.
Bett. Fruit, 1961, **55**(10): 16.

An insecticidal application to pears at the cluster-bud stage gives most effective control of pear psylla. A second spray in the summer may also be necessary, but control by a post-harvest spraying is generally of little value.—Wash. St. Univ. Exp. Stat., Wenatchee, and U.S.D.A., Yakima, Wash.

6211. Ministry of Agriculture, London.
Gooseberry and black currant sawflies.
Adv. Leafl. Minist. Agric., Lond., **30**, revised 1960, pp. 5, illus.

Life-history and control of *Pteronidea ribesii* and *Nematus olfaciens* with derris and DDT.

6212. Frediani, D.
Il *Ceroplastes sinensis* Del Geur, vivente su *Pirus communis* L. nella Toscana litoranea. **(*Ceroplastes sinensis* as a pest of *Pyrus communis* in the coastal region of Tuscany.)**
Ann. Fac. Agrar., Pisa, 1960, **21**: 89-95, bibl. 8, illus.

A severe infestation of early fruiting pear trees by this wax scale insect (*Ceroplastes sinensis*) was treated in July, August and September with a mixture of white mineral oil and a phosphoric ester [rate not specified]. All newly hatched and 2nd-instar larvae were killed within 24 hours of treatment.

6213. Anthon, E. W.
Insecticidal control of San Jose scale on stone fruits.
J. econ. Ent., 1960, **53**: 1085-7, bibl. 2.

The following materials applied in the delayed dormant stage gave the best control of San José scale (*Aspidiotus perniciosus*) on cherries and prunes: Volck Supreme oil used alone at 2 gal. per 100 gal. water or at 1 gal. in combination with Trithion at 1 pt., parathion at 1 lb., malathion at 2 lb. or diazinon at 2 lb. An ethion-dormant oil combination at 2 gal. and Sevin at 1 lb. + Volck Supreme at 1 gal. have also given good control. Field studies showed that dormant-type oils were more phytotoxic to stone fruit trees than the Volck Supreme oil, which, however, was used at a lower rate with better scale control. [From author's abstract.]—Tree Fruit Exp. Stat., Wenatchee, Wash.

Other pests.

(*See also* 6069.)

6214. Wright, E. N.
The use of traps to control bullfinches.
Exp. Hort., 1961, No. 4, pp. 55-61, bibl. 6, illus.

Tests of an improved Chardonneret cage trap on several fruit farms show that with careful siting and use through the autumn and winter this trap may be more effective than shooting for bullfinch control.—Infest. Control Lab., Worplesdon.

Chemicals and their application.

(*See also* 5732, 5733, 6133.)

6215. Minasjan, G. A.
An automatic machine for spraying two rows simultaneously. [Russian.]
Sadovodstvo, 1961, No. 2, p. 30, illus.

A description of tractor-drawn equipment for spraying 7–8 m. tall fruit trees in 10 m. wide rows.

6216. Agulhon, R., and others.
Évolution du problème de la pulvérisation en viticulture. Expérimentation de prototypes de pulvérisateurs pneumatiques. Tests de pulvérisation par avion et hélicoptère. **(The problem of spraying in vine growing. Experiments with prototype low-volume sprayers. Trials on spraying by aeroplane and helicopter.)**
Progr. agric. vitic., 1961, **155**: 217-27, illus., and 242-50, illus.

In downy mildew control trials prototype animal- and tractor-drawn low-volume sprayers gave better results than a high-volume sprayer. Likewise, low-volume aerial spraying with a Bell 47D helicopter and a Piper PA 18 aeroplane gave results superior to high-volume ground spraying. The costs of aerial spraying, per actual flying time, varied from 15 to 25 NF per ha.

6217. Haronska, G.
Dosierung bei Pflanzenschutzmassnahmen im Obstbau. **(Dosage in the application of plant protection chemicals in the orchard.)**
ErwObstb., 1961, **3**: 61-3, bibl. 2, illus.

Methods for estimating the necessary dosage per tree, and gauges for determining the amount of liquid applied, are described and illustrated.

6218. Kovàcs, A.
Prove di laboratorio e di pieno campo con miscele di ditiocarbammati e di polisolfuro di bario. **(Laboratory and field experiments with mixtures of dithiocarbamates and barium polysulphide.)** [English and French summaries ¼ p. each.]
Reprint from *Phytopath. medit.*, 1960, **1**: 25-30, bibl. 4, illus.

Control of a severe attack of apple scab by ziram was substantially improved by the addition of barium polysulphide. The improvement was greater, and highly significant, when barium polysulphide was added to zineb, which itself was more effective than ziram.

6219. Moore, M. H.
Concentrate spraying of apple trees. II. Dosage/volume relationships of lime-sulphur in disease control and spray damage.
Ann. appl. Biol., 1961, **49**: 254-66, bibl. 11.

Following earlier indications [*H.A.*, 27: 3275] of the importance of the quantity of lime-sulphur concentrate applied per acre (dosage) in the control of apple scab and powdery mildew, further intensive paint-gun experiments were designed to clarify the basic dosage/volume relationships. They established that control depends primarily on the dosage and not merely on the volume of spray applied, but the volume was in some circumstances a critical factor in spray damage. Incidental data showed the further influence of lime-sulphur dosage on fruit tree red spider mite populations and on sawfly infestations. There was evidence that the incidence of fruit russet and poor skin finish is sometimes related to impaired foliage. Gravity flow and droplet-size of the spray together increased with increasing dilution of the lime-sulphur, and thus influenced spray distribution on the foliage when a range of dilutions was applied at a fixed volume/acre. [Author's summary.]—E. Malling Res. Stat., Kent.

6220. Moore, M. H., Kirby, A. H. M., and Bennett, M.
A comparison of lime-sulphur with an organic-fungicide alternative in the apple spray programme.
J. hort. Sci., 1961, **36**: 18-27, bibl. 10.

In a comparison of high-volume sprays, continued at East Malling for 3 seasons on dwarf-pyramid trees, a mixture of dinocap (2:4-dinitro-6-(l-methyl-*n*-heptyl)phenyl crotonate) and half-strength captan was preferable to lime-sulphur for the varieties Cox's Orange Pippin and Newton Wonder as incurring less risk of spray damage, though providing no better control of scab and powdery mildew. On the varieties James Grieve and Bramley's Seedling, which are more tolerant of sulphur, the less costly inorganic spray compared more favourably, except that on all varieties it was inferior to dinocap in controlling the fruit tree red spider mite. [Authors' summary.].—E. Malling Res. Stat., Kent.

6221. Taschenberg, E. F., and Braun, A. J.
Evaluation of Phaltan for the control of grape diseases.
Plant Dis. Reptr, 1960, **44**: 560-5, bibl. 7.

Phaltan [50% N-trichloromethylthiophthalimide] has given effective control of powdery mildew on Concord grapes in New York. In limited field tests it has also given control of black rot [*Guignardia bidwellii*] and downy mildew. No phytotoxicity was observed in the Phaltan-sprayed plots in 1957 or 1958. However, in 1959 foliage injury was observed in all of the Phaltan-sprayed plots. Phaltan deposits were removed from grapes fairly rapidly by weathering. Losses, on a weight basis, were 60% or more 28 days after the final spray application. The Phaltan residue on fresh grapes 14 days after the final application was 8·6 p.p.m., while juice extracted from these grapes contained less than 0·2 p.p.m. of Phaltan. The Phaltan residue on grapes sampled 49 days after the final application was 2·3 p.p.m., while less than 0·1 p.p.m. was found in the extracted juice. Three Phaltan-DDT sprays had no consistent effect on fruit quality as measured by percentage of soluble solids. [Authors' summary.]—N.Y. St. agric. Exp. Stat., Geneva.

6222. Ercolani, G. L., and Casarini, B.
Considerazioni e risultati sperimentali sulla "rugginosità" delle mele. **(Considerations and the results of experiments on russeting in apples.)**
Inf. fitopat., 1961, **11**: 66-70, illus.

In the course of a 2-year trial the effects of a number of fungicides on russeting were investigated. Russeting was much more widespread in 1959, when the weather was cold during flowering and fruit set, than in 1960, and was much commoner with copper products than with others.

6223. Roemer, K.
Können Fruchtberostungen vermieden werden? **(Can fruit russeting be avoided?)**
Mitt. ObstVersuchsringes, Jork, 1961, **16**: 149-55, bibl. 29, illus.

The causes of russeting are reviewed and discussed.

6224. Mauri, N.
Un nouveau-né des plus prometteurs le Phosphamidon. **(Phosphamidon, a promising new material.)**
Fruits et Prim., 1961, **31**: 90-2.

Phosphamidon is now being marketed under the name of Dimecron. It is a systemic insecticide used for the control of aphids, mites and many other pests. The recommended rate is 200-300 g. a.i. per ha. The usual dose is 40 c.c. Dimecron 50 per 100 l. water. The intervals between applications should be: for aphid control—3 weeks in northern France, 2 weeks in southern France and 10 days in North Africa: for codling moth control—2–3 weeks in northern France, 10–12 days in southern France and 10 days in North Africa. For pome and stone fruits the spray should not be applied before or during flowering.

6225. Pielou, D. P., and Downing, R. S.
Dimethoate, a systemic of low mammalian toxicity as an orchard insecticide in British Columbia.
Proc. ent. Soc. B.C., 1960, **57**: 52-7, from *Biol. Abstr., Sect. E*, 1961, **36**, Abstr. 42690.

Against the pear psylla, *Psylla pyricola*, Dimethoate was more effective than malathion. Against a strain of the European red mite, *Panonychus ulmi*, resistant to organo-phosphates, it did not provide commercial control, though it performed significantly better than malathion. Owing to its residual effects Dimethoate was outstanding in preventing reinfestation by the apple aphid, *Aphis pomi*.

Under very severe reinfestation conditions, commercial control was obtained for up to 1 month by a foliage spray, for 1–2 months by trunk application with a brush, and for 2–3 months by trunk application in bandages.—Canada Dep. Agric., Summerland.

6226. Westwood, M. N., Batjer, L. P., and Billingsley, H. D.
Effects of several organic spray materials on the fruit growth and foliage efficiency of apple and pear.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 59-67, bibl. 24.

In orchard trials the growth rate of Bartlett pear fruits was reduced by 6 sprays of toxaphene or dieldrin but not by 3 sprays. Six sprays of Black Leaf 40 or malathion did not affect fruit growth rate. Application of 8 sprays of Aramite to Golden and Red Delicious apples growing on plots with ample soil moisture resulted in significantly less fruit growth and less apparent photosynthetic activity than the controls, but sprays of parathion, Kelthane or Tedion did not affect fruit growth or foliage efficiency. On plots where soil moisture was a major limiting factor sprays did not further reduce growth. In greenhouse tests on non-bearing Red Delicious apples sprays of Sulphenone resulted in less dry weight increase of leaves, less trunk growth and more chlorosis, necrosis and leaf drop than on the controls. Sprays of Aramite resulted in less shoot growth and dry weight increase and more chlorosis and mid-rib browning than on the controls. Trees sprayed with Tedion appeared normal but contained less total dry weight than the controls. Sprays of parathion or Kelthane caused a very mild chlorosis. Shoot growth was found to be a poor index of foliage efficiency. None of the 9 spray materials used in the field or greenhouse stimulated foliage efficiency. —Agric. Res. Serv., U.S.D.A., and Wash. St. Univ., Wenatchee.

6227. Kamal, A. L., and Woodbridge, C. G.
The effects of some insecticides on the nitrogen fractions of Bartlett pear leaf tissue.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 68-73, bibl. 8.

See *H.A.*, 31: 1974.

6228. Lownsbery, B. F.
Stimulation of walnut by schradan (OMPA) is not the result of root-lesion nematode control.
Plant Dis. Reptr, 1960, **44**: 690-1, bibl. 5.

Foliar sprays of schradan did not reduce the number of root-lesion nematodes (*Pratylenchus vulnus*) in the roots of nematode-infected California black walnut (*Juglans hindsii*) seedlings. This greenhouse test provided no evidence that nematode control is the mechanism for a suspected stimulation of walnuts by schradan. [Author's summary.]—Univ. Calif., Davis.

6229. Wilcox, J., and Howland, A. F.
Control of aphids and spider mites on strawberries with dusts and low- and high-gallonage sprays.
J. econ. Ent., 1961, **54**: 287-92.

In experiments conducted in southern California from 1954 through 1957, for control of the strawberry aphid (*Pentatrichopus fragaefolii*) and the two-spotted spider mite (*Tetranychus telarius*), dusts were superior to sprays for the control of aphids, but sprays were better for the control of mites. There was no difference between low- and high-gallonage sprays against either pest. With low-gallonage sprays control of both aphids and mites increased as the amount of active ingredient per acre was increased, but with the higher strengths the improvement did not justify the additional expense. In applying more toxicant per acre, there was no significant difference between increasing the gallonage per acre and increasing the strength of the spray. [Authors' abstract.]—Agric. Res. Serv., U.S.D.A.

6230. Engel, H.
Die Kirschfruchtfliegenbekämpfung mit dem Kaltnebelverfahren vom Hubschrauber aus. **(Control of the cherry fruit fly using a cold-air-aerosol from a helicopter.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1961, **13**: 73-8, bibl. 7.

For use with a helicopter the nozzle of the aerosol must be altered and a valve incorporated to lower the pressure automatically. An anti-crystallization substance should not be used in the mist solution. A tank capacity of 50 l. should serve to treat 250 trees, each requiring about 180 c.c. Misting with dichlorodiphenyl trichloroethane or methoxychlor was found satisfactory against *Rhagoletis cerasi*. —PflSchutzampt Freiburg i. Br.

6231. Maier-Bode, H.
Die Insektizid-Rückstände bei der Kirschfruchtfliegenbekämpfung mit Mitteln auf Basis von DDT und Methoxychlor. **(Insecticide residues following cherry fruit fly control with DDT and methoxychlor materials.)** [English summary $\frac{1}{4}$ p.]
Z. PflKrankh., 1961, **68**: 267-78, bibl. 17.

After application of DDT or DMDT as high or low volume sprays, from a helicopter or the ground, the highest insecticide residues found on ripe fruits were 0·74 p.p.m. DMDT. Insecticide residues on the leaves 7–10 days after spraying were on an average 40 times greater than those on fruits. Distribution of insecticides in the tree crowns was not uniform, being more concentrated in the upper part with helicopter application, and more concentrated in the lower part with ground spraying. From the toxicological standpoint, the author recommends a change-over from DDT to DMDT for *Rhagoletis* control.—Pharm. Inst., Friedrich-Wilhelms Univ., Bonn.

6232. Taschenberg, E. F., Mack, G. L., and Gambrell, F. L.
DDT and copper residues in a vineyard soil.
J. agric. Food Chem., 1961, **9**: 207-9, bibl. 13.

A determination was made of the accumulation of DDT and copper residues in the soil of a vineyard in which 3 or 4 sprays had been applied annually for 6 and 12 years. The build-up of DDT in the top 3 in. of soil was about 18 lb. per acre for the 6-year and 27 lb. per acre for the 12-year treatment. About ½ of the total DDT applied over the 6 years and ⅔ of that applied over the 12 years was not recovered from the soil. Only small amounts of DDT were found beneath the top 3 in. of soil. Before any sprays were applied the Cu content of the soil was 40 p.p.m. By the end of 6 years the top 3-in. layer contained twice as much Cu, but the 3–6-in. layer was unaffected. After 11 years there was about 3 times the original amount of Cu in the upper 3-in. layer and nearly twice as much in the second 3 inches.—N.Y. St. agric. Exp. Stat., Geneva.

6233. Hering, M.
Aldrin im Weinbergsboden. **(Aldrin in vineyard soils.)**
Weinberg u. Keller, 1961, **8**: 69-76, bibl. 11, illus.

It was shown that aldrin is not appreciably washed out of the soil or spread by the vapour phase. Although the larvae of *Otiorrhynchus* were scarcely affected by aldrin, the adults were killed if aldrin was applied to the soil surface around the stems. Under the conditions of the Mosel valley aldrin remained in the soil around the stems for at least a year.—Inst. Rebenkrankh., Bernkastel-Kues.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 5643, 5655, 5717, 5724, 5734, 5752, 5932, 7254, 7258, 7263, 7265, 7269, 7277, 7280.)

6234. Lamm, R., Tometorp, G., and Åvall, H.
Klassificerande sort- och stamförsök med köksväxter 1957-59. **(Classification trials of vegetable varieties 1957-59.)** [English and Esperanto summaries 1 p. each.]
Medd. Trädgårdsförs., Alnarp **132**, 1960, pp. 25, bibl. 10.

Varieties of bean, tomato, sugar pea, winter dill, white cabbage, celeriac and outdoor spinach.

6235. Rodríguez Z., E.
Hechura y manejo de semilleros. **(The establishment and maintenance of seed-beds.)**
Agric. trop., Bogotá, 1960, **16**: 575-80, illus.

Including a table of seeding rates, sowing depths and minimum germination percentages for 10 vegetables in Colombia.

6236. Volkova, A. A.
The structure of the seed-plant of biennial vegetable species in relation to their first and second years of life. [Russian, with English summary 10 lines.]
Izv. Timirjazev. sel'sk. Akad., 1960, No. 6, pp. 30-43, bibl. 3, illus.

The type of branching of the flowering head of cabbage, beet, turnip, horse-radish and carrot is described and the 4 main types are illustrated. The seed yields and seed quality from each type of head, and from different parts of a seed head, were investigated. The highest yields of cabbage seeds were obtained by sowing larger seeds, and more larger seeds were found in seed heads formed from one central stem, and in the upper part of the seed head. The time of sowing and the size of root at the end of the first year were found to influence the type of branching of the seed head and also the yield and quality of the seed. Smaller roots produced more of the high yielding type of seed head, and later sowing also increased seed yield and quality.

6237. Menn, J. P.
Plastic mulches.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 114-17, bibl. 4.

A brief review of types of plastic film used, their function and methods of application and results of field trials with vegetables.

6238. Jackson, R. M., and others.
Azotobacter and plant growth.
A.R. Rothamstead exp. Stat. 1960, 1961, pp. 91-2.

Azotobacter inoculation of cress seedlings grown on nutrient agar containing inorganic N gave a significant yield increase of 13%. Radishes grown in pots responded in various ways according to the potting medium and the method of inoculation; with one soil the response was significantly negative, but became significantly positive with high N application. Spinach responded positively to surface inoculation of the fertilized potting soil.

6239. Baumann, E.
Über den Wert von Niedermoortorf-Stallmist-Komposten für den Gemüsebau. **(The value of composts of low-moor peat plus farmyard manure in vegetable growing.)** [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1961, **9**: 66-81, bibl. 20.

In pot studies composted mixtures of peat and FYM produced better growth of spinach than either material alone. Mixtures of 1 or 2 parts of peat to 1 part of FYM were satisfactory media for raising young lettuce, cabbage and tomato plants. In field trials on humus-deficient sandy soils incorporation of the peat/FYM compost gave good results with spinach, leeks, lettuces and beans. —Inst. Gemüseb., Grossbeeren.

6240. REINHOLD, J. (EDITOR).
Mineraldünger im Gemüsebau. **(Mineral fertilizers in vegetable growing.)**
Bergbau-Handel, Berlin, W.8, [1959?], 8½ × 6 in., pp. 175.

This book contains 4 articles which give some of the results of the work on vegetable nutrition being carried out at the Humboldt University Institute for Vegetable Growing, Grossbeeren, and the German Academy of Agricultural Sciences Institute of Horticulture, Grossbeeren. The articles (in German, each with a short English summary) are as follows: *I. Baumann, E., The suitability of peat plus mineral fertilizers for raising young vegetables*, pp. 9-38, bibl. 12, illus. Experiments were carried out with young sphagnum peat possessing good physical characters but acid in reaction and with a low nutrient content. The addition of nitrate of lime, ammonia, superphosphate and "Reform" or "Emge" potash so as to provide 0·35 kg. N., 0·20 kg. P_2O_5, 0·35 kg. K_2O and 3 kg. $CaCO_3$ per cu. m. produced a medium suitable for raising vegetable plants. Plants grown on the peat developed larger root systems than those grown on ordinary composts [see also *H.A.*, 30: 5321.]; *II. Göhler, F., The use of nutrient solutions of mineral fertilizers in the water culture of vegetables*, pp. 39-71, bibl. 9, illus. Experiments now in progress show the possibility of using solutions of commercial mineral fertilizers rather than those of pure salts. Using the commercial fertilizers the yields of greenhouse cucumbers were as high as with pure salts and costs were reduced by half. With tomatoes yields were higher with the fertilizer solutions than with pure salts; *III. Geissler, T., and Kurnoth, P., The nutrient absorption of potassium, calcium and magnesium by the more common vegetables in relation to the magnesium content of applied fertilizers*, pp. 73-130, bibl. 26. In long term field experiments with 18 different kinds of vegetables, a large increase in the Mg content and a narrowing of the Mg:Ca and Mg:K ratios in the plants resulted from the application of Mg in the fertilizer. However, the actual K absorption sometimes increased, indicating that the supposed antagonism between K and Mg is unproved. The trials indicate that, in general, vegetables have a definite need of Mg and that it should be included in the fertilizer. *IV. Geissler, T., Absorption of nutrients through the leaves of vegetable plants*, pp. 131-75, bibl. 19, illus. Trials with several vegetables, including tomato and cucumber, have shown the possibility of supplying a proportion of the required nutrients through the leaves. Nutrient solution concentrations of 0·3–0·6% were the most suitable, and solutions of single nutrients were better utilized than solutions of compound fertilizers. 25% of the N and 75% of the P_2O_5 required by the plants could be absorbed by the leaves, but no definite figure could be determined for K. [See also *H.A.*, 30: 601.]

6241. STABROWSKA, J.
Wzrost roślin na azotanach lub na solach amonowych w zależności od stopnia natlenienia podłoza. **(Growth of plants with nitrates or ammonium salts in relation to the oxygen supply of the substratum.)** [German summary.]
Acta Soc. Bot. Poloniae, 1959, **28**: 589-620, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 71,559.

Various plants including tomatoes, red beets and cabbages were grown in nutrient solutions of ammonium and nitrate salts, the O_2 supply and pH of which were varied. All 3 plants were highly sensitive to lack of O_2 and grew better in the nitrates than in the ammonium salts. Nitrates could, to some extent, remedy the O_2 deficiency. Inst. Plant Physiol., Wroclaw.

6242. INDEN, T., MISAWA, C., AND TAKEI, A.
Potassium requirement of vegetable crops.
Japanese Potassium Symposium, Tokyo, 1958, pp. 60-75, bibl. 21, illus.

Spinach growth was very severely checked, and kidney beans and cucumbers were markedly affected, by K deficiency, whereas capsicums, stone-leeks (welsh onions) and shungiku (*Chrysanthemum coronarium*) suffered comparatively mildly. The K contents of roots and stems were generally below 1·5% in those species in which low K nutrition checked growth. A high cation-exchange capacity of the roots tended to be associated with high sensitivity to K deficiency in summer vegetable crops. The reduction of K uptake by plants grown at a high N level was apparently not enhanced by the rise in root cation-exchange capacity induced by high N in such crops as legumes.—Mie Univ., Japan.

6243. NEELAKANTAN, V., AND MEHTA, B. V.
Studies on copper deficiency and toxicity symptoms in some common crops of Gujarat (India).
J. agric. Sci., 1961, **56**: 293-8, bibl. 25.

The symptoms of Cu deficiency and toxicity described for cluster beans (*Cyamopsis psoraloides*), bottle gourd (*Lagenaria leucantha*) and eggplant. The uptake of Cu increased with supply, and there was a decrease in the Mo content of the plants as the Cu application increased. [For similar work on boron see *H.A.*, 31: 2332.]—Inst. Agric., Anand.

6244. Weber, A.
Molybdaenmangel. **(Molybdenum deficiency.)**
Reprint from *Gartnertidende*, 1960, Nos. 13 and 14, pp. 7, bibl. 45, illus.

A review of work on the importance of Mo in plant nutrition, including deficiency symptoms shown by various vegetables, and correction of the deficiency.

6245. Ōsawa, T.
Studies on the salt tolerance of vegetable crops in sand culture. I. Fruiting vegetables. [Japanese, with English summary ⅔ p.]
J. hort. Ass. Japan, 1960, **29**: 294-304, bibl. 18.

Tomatoes, peppers, cucumbers, broad beans, snap beans and strawberries were treated with sodium chloride solutions of various concentrations (1,000–16,000 p.p.m.). With increasing concentration the plants became dwarfed, lateral shoots were restricted and there were reductions in the fresh and dry weights of the tops, the yields, the number of flowers and the rate of fruit setting. Death of the entire plant was caused in cucumbers, broad beans and snap beans at concentrations above 8,000 p.p.m., and in strawberries above 4,000 p.p.m. The first harvest of peppers was retarded at the higher concentrations, owing to severe shedding of the early fruit. Severe symptoms of salt injury occurred in tomatoes and peppers at 16,000 p.p.m., in cucumbers and snap beans at 8,000 p.p.m. and in strawberries at 2,000–4,000 p.p.m. Broad beans did not develop specific symptoms. With increasing concentrations of sodium chloride, the concentrations of Na, K, Mg and Ca in the leaves increased, except in snap beans and peppers where the total Na, K, Mg and Ca contents decreased.

6246. Chiapparini, L.
Nuovi orientamenti in tema di diserbo e diserbanti. **(New trends in weed control and herbicides.)**
Reprint from *Inf. agrar.*, 1959, No. 12, pp. 10, illus.

The use of herbicides in crops, including asparagus, lettuces, spinach, onions, leeks, carrots and celery and in orchards.

6247. Thompson, F. B.
Tolerance of crops and weeds to new chemicals.
Proc. 13th N.Z. Weed Control Conf., 1960, pp. 71-5, bibl. 2.

In trials to assess the value of some recent herbicides in New Zealand, a logarithmic sprayer was used to apply amiben, fenac, CDAA, CDEC, CDEA, EPTC, trietazine and simazine to carrots, onions, beet, lettuces and marrow-stem kale. For results see *Weed Abstr.*, **10**, No. 463.

6248. Canova, A., and others.
Avversità delle colture orticole. **(Diseases and pests of market-garden crops.)**
Progr. agric., Bologna, Suppl., 1960, pp. 43, illus.

Descriptions of the commoner pests and diseases of vegetables and small fruits, with brief indications of control measures.

6249. McLean, D. M.
Diseases caused by tobacco ringspot virus in the Lower Rio Grande Valley of Texas.
Plant Dis. Reptr, 1960, **44**: 738-41, bibl. 14.

On the basis of symptom similarities, serological reactions and results of indexing trials, it is concluded that the virus causing eggplant yellows, water-melon pimples, cantaloupe mosaic and bean top necrosis is a yellow strain of TRSV. [From author's summary.]—Agric. Res. Serv., U.S.D.A., and Tex. agric. Exp. Stat., Weslaco.

6250. Baldacci, E.
Malattie delle piante trasmesse per seme e mezzi di prevenzione. **(Seed-transmitted plant diseases and their control.)**
Quad. Ente naz. Sem. elet. **7**, 1959, pp. 36, illus.

The plants discussed include many vegetables and tobacco. Brief notes are given on seed treatment and numerous seed dressings are listed.

6251. Sayed, M. Q.
The effect of nutrition, pH and nematodes on damping-off disease of pea, tomato and cucumber.
Diss. Abstr. 1961, **21**: 1701-2, being *L.C. Card No. Mic.* 60-5459 of 74 pp.

In inoculation studies with damping-off fungi, *Pythium ultimum* and *Rhizoctonia solani* were the most pathogenic to pea and cucumber and *P. debaryanum* was the most pathogenic to tomato. As the salt concentration in a balanced nutrient solution was increased, there was always a decrease in disease severity in pea and cucumber and an increase in tomato. When unbalanced nutrients were supplied, disease indices of pea and cucumber were significantly less with high N and high P than with low N and low P. Tomato seedlings responded contrarily to the N concentration and similarly to the P concentration; variations in K levels did not affect disease severity. In pot experiments high populations of nematodes (*Meloidogyne hapla*) increased disease severity in peas inoculated with *Rhizoctonia solani* compared with inoculated peas without nematodes. A slight increase in disease severity was noted in cucumbers with nematodes, but tomatoes showed no effect of the nematodes. Variations in N or P levels did not modify disease severity in an experiment with uninoculated seedlings growing in nematode-infested soil; in the fungi-nematode test disease ratings were lower with high P than with low P.—Pa St. Univ.

6252. Chambers, S. C., and Hardie, M.
Sclerotinia rot of vegetables.
J. Agric. W. Aust., 1961, **2**: 41-3, illus.

Symptoms, spread and control by sanitation measures and PCNB dusting.

6253. Gottlieb, D., and Pote, H. L.
Tetrin, an antifungal antibiotic.
Phytopathology, 1960, **50**: 817-22, bibl. 16.

This antibiotic was not toxic to a range of vegetable plants when sprayed at 250-1,000 μg./ml. However, it was not readily translocated in the plants and had only slight fungicidal activity. [See also *H.A.*, 29: 3560.]—Univ. Ill., Urbana.

6254. Ministry of Agriculture, London.
Root-knot eelworm in glasshouses.
Adv. Leafl. Minist. Agric., Lond., **307**, revised 1960, pp. 4, illus.

Meloidogyne spp., symptoms, life history and control.

6255. Ministry of Agriculture, London.
Glasshouse symphylids.
Adv. Leafl. Minist. Agric., Lond., **484**, 1960, pp. 5, illus.

Symptoms of damage and control of *Scutigerella immaculata.*

6256. MacGillivray, J. H., and Zahara, M.
The most economical length of picking row for hand harvest.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 710-16, bibl. 4, illus.

A theoretical approach was used to determine the most economical length of picking row a vegetable grower could use to harvest his crop. Factors such as the number of times the picking distance is walked, the distance between roads in the field, and the point at which the picker begins picking affect the walking distance. A labourer harvesting a given length of row will walk farther when yields are high than when the yields are low. The use of a small picking container instead of a large one will increase the distance he has to walk. Short rows require less walking at harvest, but roads decrease the productive capacity of a field. Formulae are presented which can be used to determine distance walked, and cost of walking plus value of crop lost to roads. Based on the conditions given in this paper, the most economical length of picking row is about 165 feet.—[Authors' summary.]—Univ. Calif., Davis.

6257. Heikal, H. A., and El-Mahmoudi, L.
Studies on moisture losses of vegetables during marketing.
Agric. Res. Rev., Cairo, 1959, **37**: 525-31, bibl. 5.

Washing and drying before storage had little effect on moisture loss except in the case of okra. The effective storage life of eggplant was 2–4 days at room temperature and 2–3 weeks at 32° F.; for green capsicum the periods were 4 days and 4 weeks respectively, for okra 3 days and 1 week and for cucumber 4 days and 2 weeks. After removal from storage at 32° F. the period of marketability ranged from 1 day for okra to 3 days for eggplant.

6258. Matthews, R. F.
Gas and paper chromatography of volatile flavor constituents of several vegetables.
Diss. Abstr., 1961, **21**: 1693-4, being *L.C. Card No. Mic.* 60-6507 of 113 pp.

Determined for fresh tomatoes and peas, and for snap beans before and after various storage periods.

Artichokes.

6259. Jefford, T. G., and Edelman, J.
Changes in content and composition of the fructose polymers in tubers of *Helianthus tuberosus* L. during growth of daughter plants.
J. exp. Bot., 1961, **12**: 177-87, bibl. 9.

Most of the dry weight of sprouting Jerusalem artichoke tubers was lost during the first few weeks of growth of the new shoots. At least 80% of this loss was accounted for by the disappearance of polymerized fructose, and it was demonstrated that much, if not all, of this material was translocated to the growing shoots, presumably in the form of sucrose. [From authors' summary.]—Imp. Coll., London.

6260. Koževnikova, L. M., and Onufriev, A. F.
Diseases of Jerusalem artichoke. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(8): 56-7.

The most severe disease of Jerusalem artichoke in the U.S.S.R. is *Sclerotinia libertiana*; hybrids 54 and 53 are the most resistant varieties. Other diseases affecting the plant include *Botrytis cinerea*, *Macrosporium* sp. and *Alternaria* sp. Recommended preventive measures are the planting of resistant varieties, crop sanitation and growing the crop for not more than 2–3 years in the same place.

6261. Lipton, W. J., and Harvey, J. M.
Decay of artichoke bracts inoculated with spores of *Botrytis cinerea* Fr. at various constant temperatures.
Plant Dis. Reptr, 1960, **44**: 837-9, bibl. 2.

Avoidance of injury and keeping the temperature below 10° C. during all stages of handling will reduce the decay in globe artichokes.

Asparagus.

(*See also* 7270.)

6262. Scheer, D. F., and Ellison, J. H.
Asparagus performance as related to seedling vigor.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 370-5, bibl. 7, illus.

A positive correlation was established between high vigour of young seedlings and a high survival rate in the field.

6263. Ellison, J. H., and others.
Estimating comparative yields of asparagus strains without full season harvest records.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 376-81, bibl. 18.

Asparagus strains can be reliably classified as to yield on the basis of brush vigour and/or early yield over a wide range of ecological conditions. [See also *H.A.*, 29: 2439 and 3571.]

6264. Jungermann, K., and Schlüter, H.
Kalkstickstoff und Spargelqualität. **(Calcium cyanamide and asparagus quality.)** [English and French summaries ¼ p. each.]
Landw. Forsch., 1961, **14**: 98-100.

No measurable differences in the composition, texture or canning properties of asparagus were observed following the application of calcium cyanamide as a fertilizer and herbicide, and there was a slight improvement in flavour.—Landw. Versuchsanst., Darmstadt.

6265. Kovács, A.
Prove di diserbo chimico dell'asparago. **(A chemical herbicide trial on asparagus.)** [English summary 4 lines.]
Riv. Ortoflorofruttic. ital., 1961, **45**: 66-70, bibl. 8, illus.

In trials on a 6-year-old bed of Early Argenteuil asparagus the treatments were: (1) 5 kg. Randox (CDAA) per ha., (2) 3 kg. 50% simazine or (3) 3 kg. of a 60:40 mixture of 50% ATA and 50% simazine, each in 20 hl. water per ha. Simazine alone and in mixture gave excellent results, keeping the beds clean throughout the spring and having no adverse effect on the crop. It is recommemded that application should be made in 5–6 hl. water per ha. to the bare earth in early spring 3–4 days after hoeing. Beds under 2 years old should not be treated.—Ist. Pat. veg., Univ. Bologna.

6266. (Ries, S., and Stout, W.)
5 inches and up only!
Amer. Veg. Gr, 1961, **9**(6): 18.

An experimental asparagus harvester snaps off only spears more than 5 inches high using a series of snapping units on revolving chains which then carry the spears to the rear of the machine.—Mich. St. Univ.

6267. Kramer, A., and others.
The measurement of fibrousness of asparagus.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 382-8, bibl. 12.

A bulk measurement method for estimating the variability within a sample.

6268. Brichet, J.
Essais de conservation commerciale des asperges. **(Trials on commercial storage of asparagus.)**
Fruits et Prim., 1961, No. 316, pp. 7-9.

Asparagus stored well and was virtually free from disease during 40 days at 0° C. and 90% R.H.

Brassicas.

(*See also* 5641, 5646, 5707, 6200, 6239, 6241, 6408, 7264.)

6269. Ministry of Agriculture, London.
Cabbages, brussels sprouts and other green crops.
Bull. Minist. Agric., Lond., **132**, 3rd edition, 1960, pp. 35, illus., 3s.

In this revised edition notes have been added on calabrese, and the section entitled "Local practices in the main production areas" has been removed from the appendices and now forms the last chapter.

6270. McCubbin, E. N.
Supplemental fertilizers for cabbage.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 156-60, bibl. 3.

From experiments carried out over 4 seasons it is concluded that for maximum yields of cabbage in the Hastings area the soil should be maintained at about pH 5·7 to 6·0. When soils are fertilized before planting with 0·8–0·9 ton of a 7:9:9 fertilizer or equivalent per acre, supplemental fertilizer, particularly nitrate N, will be required. In dry seasons 1 side dressing of nitrate of soda, supplying 24 lb. of nitrate N per acre, should be applied 15 days after planting. In wet seasons 2 or 3 side dressings may be needed; the first 2 should be of nitrate of soda, 15 and 50 days after planting, each providing 24 lb. of nitrate N, and if a 3rd is required it should be applied 90 days after planting, and, in addition to N, it should provide 22 lb. of K per acre. [For earlier work see *H.A.*, 30: 3741.]—Potato Invests Lab., Hastings, Fla.

6271. Eguchi, T.
Influence of nitrogenous fertilizer applied at different stages of growth on seed production in cabbage and Chinese cabbage.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 425-35, bibl. 12, illus.

Experiments with pot-grown cabbages during 2 seasons and with Chinese cabbages during a third showed top-dressings of N, applied in solution, to have the following effects: (1) N applied at the bolting stage increased the numbers of secondary shoots, flowers and fruits and the yield of seeds; and (2) N applied during flowering increased fruit set. The yield of seeds was closely correlated with the number of secondary shoots. [For the experiments with Chinese cabbage, see also *H.A.*, 31: 4400.]—Nat. Inst. agric. Sci., Hiratsuka, Japan.

6272. Miyazaki, Y.
Manurial effects of nitrogen on the heading of Chinese cabbage *(Brassica pekinensis)*. [Japanese, with English summary.]
Bull. Hiroshima agric. Coll., 1960, **1**(3): 17-22, from *Biol. Abstr., Sect. D*, 1961, **36**, Abstr. 32,216.

In Chinese cabbage, to which N fertilizer was normally supplied, the water content of the leaves was always high in the early stages of growth but decreased gradually to its lowest point at the time of heading. The closer to the centre a leaf was, the greater was the rate of decrease. The cell sap concentration and specific gravity of the dry matter also showed a marked difference between the growing and head-forming stages, both decreasing during the growing season. An accumulation of reserve substances in the leaves resulting from the N supply took place in the course of growth. Chinese cabbage to which no N fertilizer was supplied formed only a small, loose head, weighing not more than 40% of the fresh weight of the manured plant.

6273. Sato, K., and others.
Boron deficiency in Chinese cabbage. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1960, **29**: 305-9, bibl. 10, illus.

Boron deficiency symptoms in Chinese cabbage, grown on sandy loam and loam soils (pH 5–6) with an available B content of 0·09 p.p.m., were most severe in the variety Matsushima, followed by Kaga and Nozaki. The deficiency symptoms increased when excess N, K and Ca were applied. Applications of borax (100 g./are) are recommended to correct the deficiency. The symptoms were severe when the rainfall before heading was low.

6274. Sandwell, I.
Propagation and planting of early summer cauliflower.
Exp. Hort., 1961, No. 4, pp. 41-54, bibl. 9, illus.

The effects of sowing and planting dates and methods of propagation on curd size were studied. Sowing during the last week in September produced high yields provided planting was early; this was particularly important for plants raised under Dutch lights. The omission of hoof and horn meal from J.I.P. composts produced no detrimental results. Plants raised by broadcast sowing in frames, and not pricked out before planting, produced satisfactory, but late, crops. Increasing the level of N in the field gave a marked increase in the total crop yield. [From author's summary.] —Stockbridge House exp. Hort. Stat.

6275. Nieuwhof, M.
Groene broccoli. **(Green sprouting broccoli.)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1961, **24**: 371-6, 386, illus.

In spacing trials with 3 varieties planted in early July, the weight of the harvested shoots increased as plant spacing became wider, but total yields per sq. m. were much higher at 30 × 30 than at 60 × 60 cm. spacing. The main harvesting period for broccoli planted out in late May or early June was in July and August, but when planting out was done in mid-July only a small crop had been picked by the end of October.—I.V.T., Wageningen.

6276. Benson, N. R., Degman, E. S., and Chmelir, I. C.
Translocation and re-use of boron in broccoli.
Plant Physiol., 1961, **36**: 296-301, bibl. 9, illus.

Broccoli plants were grown in a complete nutrient solution with 0·5 p.p.m. B until about 45 days before flowering. Thereafter until flowering a minus-B solution was used, and the leaves were sampled for analysis at intervals of 4 days. B deficiency symptoms developed after 24 days in the minus-B solution. Growth continued and B was constantly being translocated within the plant to the youngest tissues. There was no loss from the basal leaves but marked changes occurred in the younger leaves. For example, the B concentration in the 22nd leaf from the base changed from 33 to 2 p.p.m.—Wash. St. Univ., Wenatchee.

6277. Ellis, R. J., and Davies, D. D.
Glutamic-oxaloacetic transaminase of cauliflower. I. Purification and specificity.
Davies, D. D., and Ellis, R. J.
Idem. 2. Kinetics and mechanism of action.
Biochem. J., 1961, **78**: 615-23, bibl. 31, and 623-30, bibl. 16.

Isolated from the florets.

6278. Opsahl, B., and Ringlund, K.
Avling, handelsverdi og matkvalitet hos forskjellige kålrotsorter. **(Yield, commercial value and table quality of different varieties of swede.)** [English summary 1 p.]
Forskn. Fors. Landbr., 1961, **12**: 57-78, bibl. 9, illus.

Eight varieties evaluated for human consumption on the basis of results from the 1959 growing season.

6279. Wiggell, P., and others.
Field trials on the control of club root in Brassicae.
Ann. appl. Biol., 1961, **49**: 110-19, bibl. 10.

Experiments were carried out during 1957-59 on the fungicidal control of club root in summer and winter cauliflowers, brussels sprouts, summer cabbages and savoys. Plants were treated immediately before setting out or in their final position. A suspension of 1 or 2 oz. 100% calomel per pint gave the best control of the disease; 4% calomel paste was effective but treated plants suffered an initial check from which they only slowly recovered. Formulations of pentachloronitrobenzene and of aldrin did not give satisfactory control. Several methods of applying metham-sodium were tried, but they also gave poor control of the disease. [From authors' summary.]—N.A.A.S., Exeter.

6280. Winstead, N. N., and Garriss, H. R.
Control of cabbage clubroot in North Carolina.
Plant Dis. Reptr, 1960, **44**: 14-18, bibl. 13, illus.

Terraclor at rates of 2, 3 or 6 lb./100 gal. of water applied at transplanting effectively controlled club root on Badger Market cabbage in heavily-infected soils. When long season varieties such as Oakview were planted under similar conditions, only a few plants produced heads of marketable size and quality. Treatment of the seed-bed sites with 1, 2 or 3 lb. methyl bromide per 100 sq. ft. gave excellent control of both club root and wirestem. [From authors' summary.]—N.C. St. Coll., Raleigh.

6281. Ministry of Agriculture, London.
Cabbage aphid.
Adv. Leafl. Minist. Agric., Lond., **269**, amended 1960, pp. 5, illus.

Life history and control of *Brevicoryne brassicae.*

6282. Lowe, A. D.
Control of the cabbage aphid (*Brevicoryne brassicae* L.) with some systemic materials.
N.Z. J. agric. Res., 1960, **3**: 842-4, bibl. 2.

In decreasing order of effectiveness, Megatox (4 oz. a.i.), Metasytox (8 oz.), Ekatin (4 oz.) and Metasystox (4 oz.), all in 20 gal./acre, gave control of the aphid.—D.S.I.R., Lincoln.

6283. Reid, W. J., Jr., and Cuthbert, F. P., Jr.
Control of caterpillars on commercial cabbage and other cole crops in the south.
Fmrs' Bull. U.S. Dep. Agric. **2099**, revised 1960, pp. 24.

With chemicals and by cultural means.

6284. Ratcliffe, R. H., Ditman, L. P., and Whitlaw, J. T., Jr.
Field experiments on insecticidal control of insect pests of cabbage and broccoli.
J. econ. Ent., 1961, **54**: 356-9, bibl. 5.

Based on the percentage of undamaged cabbage heads at harvest, weekly applications of thiodan or Dibrom gave better control of the cabbage looper (*Trichoplusia ni*) and the imported cabbage worm (*Pieris rapae*) than did methyl Trithion, Phosphamidon, Kepone or methoxychlor. Dimethoate, Dibrom or thiodan, followed by Dibrom + Perthane or malathion + Perthane, gave a greater reduction of the cabbage looper in broccoli heads at harvest than did methyl Trithion, Phosphamidon, thiodan ($\frac{1}{2}$ rate) or Am. Cyanamid 24055. [From authors' abstract. For earlier work see *H.A.*, 30: 2153.]—Univ. Md, College Park.

6285. McEwen, F. L., and others.
Field tests with *Bacillus thuringiensis* Berliner for control of four lepidopterous pests.
J. Insect Path., 1960, **2**: 152-64, from abstr. in *Z. PflKrankh.*, 1961, **68**: 313.

In field trials industrial formulations of *Bacillus thuringiensis* gave control of caterpillars of *Pieris rapae*, *Trichoplusia ni* and *Argyrotaenia velutinana* equal to that obtained with chemical insecticides. Control of *Carpocapsa pomonella* was not satisfactory.

Celery.

(*See also* 5613, 5641.)

6286. Westgate, P. J., and Forbes, R. B.
Effects of maleic hydrazide and gibberellic acid on bolting of celery.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 136-8, bibl. 4.

Spraying winter grown celery with MH at rates up to 1,000 p.p.m. increased bolting, and at rates above 1,000 p.p.m. decreased bolting but caused twisting of the hearts, stunting and internal browning. Spraying with GA increased the height of the celery plants but also increased bolting.—Cent. Fla Exp. Stat., Sanford.

6287. Clijsters, H., and Sironval, C.
À propos d'une expérience d'application de gibbérelline à des céleris et à des carottes. **(An experiment on the application of gibberellin to celery and carrots.)**
Bull. hort., Liège, 1961, **16**: 3-8, bibl. 4, illus.
De invloed van gibberelline op selder en wortelen. **(The effect of gibberellin on celery and carrots.)**
Tuinbouwberichten, 1961, **25**: 81-3, illus., and 112-14, bibl. 4, illus.

Applications of GA (100–300 p.p.m.) plus NPK fertilizer greatly increased the size of celery leaves, more than doubling them when the N was applied as urea. Treatment of carrots with GA (50–300 p.p.m.), with or without fertilizer, resulted in larger leaves and roots, but doses over 50 p.p.m. produced swollen roots with a low carotene content and an abnormal development of the xylem.

6288. Orsenigo, J. R.
Evaluation of N-(3,4-dichlorophenyl)-2-methylpentanamide for post emergence weed control in celery.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 184-91.

In seed-bed experiments Karsil at 1 to 3 lb./acre was applied alone or in combination with Vegadex at 1 to 3 lb. In the field Karsil was applied at 1 to 6 lb. alone or combined with Vegadex at 2 to 5 lb./acre. Very good control of annual grass and broadleaved weed seedlings was obtained with Karsil both with and without Vegadex. In the seed-beds celery seedlings were temporarily stunted but soon recovered and were equal to untreated plants at transplanting and at harvest. Temporary growth retardation also occurred in the field, but the crop at harvest did not appear to have been affected. Karsil residues in trimmed marketable plants at harvest were barely detectable. [See also *H.A.*, 31: 2389.]—Everglades Exp. Stat., Belle Glade.

6289. BURDINE, H. W., AND THAYER, P. L.
Effects of soil and foliar applications of nitrogen, phosphorus and potassium on bacterial and early blight incidence of Utah 52-70 celery.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 123-9, bibl. 16.

Of the 2 experiments reported, the 1st was on field-grown celery in soil of adequate N status and the 2nd on seed-beds on soil in which pronounced N deficiency developed in the plots receiving no N. In the 1st experiment bacterial blight (*Pseudomonas apii*) incidence was greater on plots receiving urea foliar sprays, and in the 2nd experiment on all plots receiving N especially on those receiving both soil and foliar applications. There was an interaction between K and N applications, particularly with foliar N, in which case K reduced the severity of the disease. A slight initial increase in early blight (*Cercospora apii*) on the N plots in the field experiment disappeared by 13 May; in the seed-bed early blight was reduced significantly by both soil and foliar N applications. Foliar K also reduced early blight in the field but did not affect it in the seed-bed.—Everglades Exp. Stat., Belle Glade.

6290. THAYER, P. L.
Control of celery early blight and bacterial blight in the Everglades with Dyrene combinations.
Plant Dis. Reptr, 1960, **44**: 167-9, bibl. 6,

For the control of early blight (*Cercospora apii*) Dyrene at 1½ lb./100 gal. was effective, and at 1 lb./100 gal. it was effective in combination with either tribasic copper sulphate or copper zinc chromate at 2 lb./100 gal. Dyrene added to the copper spray did not greatly affect control of bacterial blight (*Pseudomonas apii*). Used alone or with copper and/or streptomycin Dyrene caused no visible toxicity to celery in the seed-bed or field. [From author's abstract.]—Everglades Exp. Stat., Belle Glade.

6291. MOLLER, W. J., AND FLENTJE, N. T.
Better sprays for celery fireblight.
J. Dep. Agric. S. Aust., 1961, **64**: 448-50, illus.

TMTD, ferbam, Cyprex and ziram controlled *Septoria apii* better than bordeaux mixture. Ferbam was uneconomical and Cyprex caused marked stunting. TMTD and ziram, though slightly more expensive, are recommended, both at 1½ lb./100 gal.

6292. PAN, H.-P.
Burning-numbing taste in celery.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 223-7, bibl. 2.

The burning-numbing taste fraction in celery has been isolated. It is a faintly yellow oily liquid consisting of 4 components. [From author's summary.]

6293. PAN, H.-P., AND KENNEY, D. W.
Quantitative determination of fatty acid constituents of celery seeds by gas-liquid partition chromatography.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 219-23, bibl. 6.

Oils from celery seeds were found to contain stearic and linolenic acids and one unidentified fatty acid.

Cucurbits.

(*See also* 5609, 5618, 5662, 5732, 5733, 6242, 6243, 6245, 6251, 7264.)

6294. MEŠČEROV, Ė. T.
Changes in the proportion of male, female and hermaphrodite flowers in cucumbers.
[Russian, with English, French and German summaries ¼ p. each.]
Vestn. sel'sk. Nauki, 1961, **6**(4): 74-8, bibl. 11, illus.

In relation to breeding.

6295. WASUWAT, S. L.
Inheritance of mosaic resistance in cucumber.
Diss. Abstr., 1961, **21**: 1703, being *L.C. Card No. Mic.* 60-5807 of 69 pp.

6296. AXELSSON, F.
Arla, W:s original F_1-drivgurka. (**Arla, a new F_1 cucumber for the greenhouse.**)
[German and English summaries ⅔ p. each.]
Agri hort. genet., 1960, **18**: 234-40.

Arla is an early, high-yielding variety which has performed very well in variety trials in Sweden.

6297. ÅVALL, H.
Aktuella gurkodlingsproblem. (**Topical problems in cucumber growing.**)
Sverig. HandelsträdgårdsmForb. Årsb. 1959, reprinted as *Särtrycksser. Trädgårdsförs. Alnarp* **115**, 1960, pp. 10, illus.

Methods of training the plants, the length of the cultural period, types of bed and pruning and manuring practices discussed.

6298. OZAKI, H. Y.
Effect of sorghum windbreaks on cold and wind injury of cucumber plants.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 129-31, bibl. 7.

Two rows of sorghum were sown in every 9th bed in August and cucumbers were sown in the 8 intervening 68-in. wide beds between the windbreaks in October. The first cucumber beds east of each windbreak suffered the least injury and produced the highest yields, and the two cucumber beds on either side of the windbreaks produced higher yields than the intervening beds.—Plantation Field Lab., Fort Lauderdale.

6299. IBRAHIM, R., MOSTAFA, S., AND BASSILY, S.
Studies on the storage of cucumbers.
Agric. Res. Rev., Cairo, 1959, **37**: 481-90, bibl. 6.

The storage life of cucumbers coated in paraffin and packed in boxes lined with waxed paper or polythene averaged 5 days at 65° F. and 12 days at 50° F., and after removal from storage they remained in good condition for 3 and 2 days, respectively. Disinfection of the fruits with a 2% boric acid and 4% borax solution before packing had no effect on the physical and chemical changes during storage, and disinfection reduced the percentage of decay at the higher storage temperature.

6300. BOHN, G. W., AND MANN, L. K.
Nectarless, a yield-reducing mutant character in the muskmelon.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 455-9, bibl. 7, illus.

The nectarless character in muskmelons first attracted attention in certain breeding lines in which blooms tied for pollination failed to become moist with nectar. The dry nectary itself, which is found in both staminate and perfect flowers, is smaller than a normal nectary. It is flat-topped in staminate flowers. A large portion of the nectar-producing tissue consists of collapsed cells and, in contrast to that of normal nectaries, contains little starch before anthesis and produces little or no nectar after anthesis. Honeybees avoid nectarless flowers, especially in extensive plantings and in locations where other food sources are abundant. As a result, in contrast to normal plants, fruit set on nectarless plants is reduced and delayed. [Authors' summary.]—U.S.D.A., La Jolla, Calif., and Univ. Calif., Davis.

6301. SHADBOLT, C. A., AND MCCOY, O. D.
Temperature and plant responses to paper and plastic protectors on cantaloupes.
Hilgardia, 1960, **30**: 247-66, bibl. 6, illus.

Individual plant caps of glassine paper gave slightly better frost protection than similar caps made of polythene or vinyl film. Continuous row covers of plastic film gave better protection than individual plant caps, and also induced earlier fruit set and higher early yield. Kraft paper, 36 in. high, supported along the north side of the row and sloping over the row at about 30° from the vertical gave 10° F. additional frost protection to plants under individual caps.—Univ. Calif., Riverside.

6302. STEWART, J. K., AND LIPTON, W. J.
Factors influencing heat loss in cantaloups during hydrocooling.
Mktg Res. Rep. U.S. Dep. Agric. **421**, 1960, pp. 12, bibl. 6, illus.

Size 27 and 36 melons had a half-cooling time [i.e. the time required to halve the temperature difference between melon and water] of 20 min., whereas size 45 required only 11 min. It is thus possible to predict melon temperatures at the end of hydrocooling. After hydrocooling, the temperature at the centre of the melon decreased for a further 30–60 min., but the fruit as a whole warmed rapidly. [See also *H.A.*, 31: 2407.]

6303. BELIK, V. F., AND PODMOGAEVA, M. I.
New methods of interspecific hybridization of squashes. [Russian.]
Agrobiologija, 1960, No. 5, pp. 775-7, illus.

Cucurbita pepo, *C. maxima* and *C. moschata*, which are difficult to hybridize, were successfully crossed by methods involving either repeated pollination, pollination with mixed pollen or pre-treatment with water extracts of mixed pollen or even, in some cases, plain water.

6304. WEILING, F.
Die Geschlechtsverteilung bei *Cucurbita*-Hybriden und ihre Beziehung zu einer Ansteckungsverteilung von Neyman. **(The relation of the sex ratio in *Cucurbita* hybrids to the Neyman infection distribution.)** [French and English summaries ⅓ p. each.]
Bull. Inst. agron. Gembloux, 1960, (hors Sér.) **1**: 242-55, bibl. 15, illus.

A statistical examination of the lowering of the male/female flower ratio, particularly in the F_2 generation, in *Cucurbita maxima* × *C. pepo* hybrids.

6305. ORPHANIDES, J.
Preliminary variety trial on summer squash, in 1960.
Countryman, Nicosia, 1961, Jan.-Feb., pp. 24-5, illus.

The highest yields were from Caserta, followed by Fordhook Zucchini Improved, White Bush and Cocozelle Bush.

6306. MacGillivray, J. H.
Effect of summer squash size on picking time and yield.
Veg. Crops Ser. Univ. Calif., Davis, **109**, 1960, pp. 9, bibl. 7.

During 2 seasons squash fruits were harvested when they were 4–5, 6–7 and 8–9 in. long. As the size of the fruits increased, the number harvested per plot decreased but the total yield increased. The yield increase obtained from harvesting medium-sized compared with small fruits was 72 and 128% in the 2 years, respectively. Harvesting at the smallest, compared with the medium size, increased the time taken to pick one pound of fruit by 135 and 202% in the 2 years. When the largest size was compared with the medium size, increases in yield and savings in picking time were smaller. Growth measurements showed that individual squash fruits vary greatly in their rate of growth, but that the average rate is $\frac{3}{4}$ in. per day.

6307. Hopp, R. J., Merrow, S. B., and Elbert, E. M.
Varietal differences and storage changes in β-carotene content of six varieties of winter squashes.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 568-76, bibl. 34.

The carotene and total solids contents were determined in 5 varieties of *Cucurbita maxima* and one of *C. moschata* at harvest and at 5-week intervals during 6 months' cool storage. Significant differences were found between varieties in the β-carotene content, whether determined on a dry weight basis, a fresh weight basis or a fresh weight basis adjusted to allow for losses in weight during storage. In all varieties the lowest carotene content occurred at harvest time and the content increased during storage, especially during the first 10 weeks.—Vt agric. Exp. Stat., Burlington.

6308. Wall, J. R.
Use of marker genes in producing triploid watermelons.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 577-81, bibl. 10, illus.

A method whereby natural crossing can be used in the production of seedless triploid watermelons.

6309. Stevenson, E. C., and Johnson, K. W.
Two improved watermelon varieties for Indiana—Princeton and Charleston Gray 133.
Res. Bull. Purdue Univ. agric. Exp. Stat. **715**, 1961, pp. 6, illus.

6310. Everett, P. H.
The influence of nitrogen source and fertilizer rate on watermelon yields.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 107-11, bibl. 2.

A complete fertilizer with 30% of the N derived from natural organics resulted in significantly higher total yields and higher early yields than when 3 inorganic N sources were used. Of the 3 inorganics, ammonium sulphate gave the highest and sodium nitrate the lowest yields; yields from ammonium nitrate were intermediate. Soil analyses indicated that high yields were associated with a relatively high NH_4/NO_3 ratio. The effect of different fertilizer rates on yields was less pronounced or consistent than the effect of the N source.—S. Fla Field Lab.

6311. Fiskell, J. G. A.
Studies of the effect of dolomite filler on Sebago potato, sweet corn and watermelon yields.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 131-5, bibl. 7.

A no-phosphate fertilizer with dolomite filler produced 10 tons of watermelons per acre compared with 7 tons produced by an equivalent fertilizer with a phosphatic sand filler.—Agric. Exp. Stat., Gainesville.

6312. Showalter, R. K.
Watermelon color as affected by maturity and storage.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 289-93, bibl. 6.

Measurements of the pigment content of 8 watermelons having a wide range of maturity yielded transmittance values ranging from 52 for an immature to 16 for a fully mature fruit. Storage for 2 weeks at 72°–92° F. increased the pigment content and redness, whereas storage at 36° and 50° F. decreased the colouration.—Fla agric. Exp. Stat., Gainesville.

6313. Sitterly, W. R.
A new insect vector of squash mosaic virus.
Plant Dis. Reptr, 1960, **44**: 134-5, bibl. 1.

The banded cucumber beetle (*Diabrotica balteata*).

6314. Smith, R. J., and Read, W. H.
Investigations on fungitoxic derivatives of salicylaldehyde. I. The 3-, 5- and 3,5-chlorinated derivatives of salicylanilide and salicyl-*para*-chloroanilide. II. Chlorinated and brominated derivatives of salicylideneaniline and related compounds as eradicants of cucumber powdery mildew (*Erysiphe cichoracearum* DC.). III. Some N-substituted derivatives of halogenated salicylideneimines as eradicants of cucumber powdery mildew.
Ann. appl. Biol., 1961, **49**: 102-9, bibl. 11, 233-41, bibl. 15, and 242-5, bibl. 4.

Part I: At non-phytotoxic concentrations the salicyl-, 3-chlorosalicyl-, 5-chlorosalicyl- and 3,5-dichlorosalicyl-anilides and the -*para*-chloroanilides were not more effective than salicylanilide against either cucumber powdery mildew (*Erysiphe cichoracearum*) or tomato leaf-mould (*Cladosporium* *fulvum*). *Part II:* Of a number of salicylideaniline derivatives tested on young cucumber plants, 3-bromo- and 3-chloro-salicylideneaniline were more effective than standard sprays of Karathane, but they showed phytotoxic effects on mature plants. *Part III:* Although the activity of several compounds closely approached that of 3-chloro-salicylideneaniline, no compound of practical value was discovered.—Glasshouse Crops Res. Inst., Littlehampton.

6315. WELVAERT, W.
De fusariose van meloenen en zijn problemen. (***Fusarium* disease of melons and its problems.**) [French, English and German summaries 1 p. each.]
Verhand. Rijksst. PlZiekt., Gent, **8**, 1961, pp. 53, bibl. 38.

Control of *Fusarium oxysporum* f. *melonis* by natural antagonistic organisms was not reliable. In tests with *Penicillium commune*, *Trichoderma lignorum* and *Bacillus subtilis* results were variable, and the highest percentage of healthy plants obtained after 1 month was 25. In practical tests with soil fumigants 40% formalin (0·5 l./sq. m.) and Vapam (100 c.c./sq. m.) considerably increased melon yields in 1959. In 1960 yields were significantly increased by Trapex (100 c.c./sq. m.), but not by Camposan (60 g./sq. m.). In both years plants grafted on *Cucurbita ficifolia* gave higher yields than ungrafted plants on fumigated plots.

6316. NEKLJUDOVA, E. T.
Diseases of cucurbits. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(8): 55-6.

In the past few years in the North Osetia and Čečen-Injuški regions of U.S.S.R. a dying of the flowers of marrow and pumpkin plants has occurred. The same condition was observed in cucumbers, melons, eggplants, sweet peppers and tomatoes. The flowers died only when they were not pollinated soon after flowering. When artificially pollinated, almost 100% of the flowers bore fruit and the yield was doubled. *Pythium* sp. and *Rhizophus* sp. are considered to be the main pathogens. For control spraying with 1% bordeaux every 10–15 days is recommended.

6317. WINSTEAD, N. N., AND MCCOMBS, C. L.
Pectinolytic and cellulolytic enzyme production of *Pythium aphanidermatum*.
Phytopathology, 1961, **51**: 270-3, bibl. 27.

Softening of cucumber fruits affected by cottony-leak disease appeared to be correlated with the activities of the specific pectinolytic and cellulolytic enzymes produced by *P. aphanidermatum*. —N.C. State Coll., Raleigh.

6318. VAN DIEPEN, J. R.
Bioassay of the systemic activity of cycloheximide semicarbazone in cucumber plants.
Phytopathology, 1960, **50**: 795-7, bibl. 13.

Studies using extracts from various parts of cucumber plants treated with the antibiotic and on *Pythium ultimum* as a test fungus.

6319. WINCHESTER, J. A., AND HAYSLIP, N. C.
The effect of land management practices on the root knot nematode, *Meloidogyne incognita acrita*, in South Florida.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 100-4, bibl. 4, illus.

In small-scale trials clean cultivation or growing pangolagrass [*Digitaria decumbens*] in infected soil for 2 months gave very good control of the nematodes on subsequent crops of cucumbers and tomatoes.

Legumes—beans.

(*See also* 5613, 5622, 5641, 5647, 5648. 5654, 5656, 5672, 5673, 5679, 5693, 5729-5731, 5733, 5741, 6239, 6242, 6243, 6245, 6668, 7288, 7289.)

6320. RAMÍNEZ, O. D., AND QUIÑONES, J. A.
Snap bean variety trials at the Lajas substation. [Spanish summary ½ p.]
J. Agric. Univ. P.R., 1961, **45**: 26-31, bibl. 8.

In 1959 trials Florigreen was the highest yielding of 5 varieties of pole beans tested. Topcrop, Wade, Tender Pod and Topmost were the only promising varieties among 16 bush snap beans grown.

6321. CARDONA ÁLVAREZ, C.
Líneas de fríjol, resistentes a la roya, seleccionadas en el Centro Nacional de Investigaciones Agrícolas "Tulio Ospina" (Medellín). (**Rust-resistant races of beans selected by the Tulio Ospina National Centre for Agricultural Research, Medellín.**)
Agric. trop., Bogotá, 1961, **17**: 90-7.

From the varieties Panameño, Algarrobo, Estrada Rosado, Uribe Redondo and Sangretoro,

6322. ZAUMEYER, W. J.
A new race of bean rust in Maryland.
Plant Dis. Reptr, 1960, **44**: 459-62, bibl. 3, illus.

A new race (32) of *Uromyces phaseoli* var. *typica* severely attacks most dwarf beans, but most of the climbing and dry-pod varieties are more resistant. Wax-podded beans are particularly susceptible. Some resistant varieties are named.

6323. TEDORADZE, S. G.
The effect of radioactive irradiation on plants. [Russian.]
Priroda, 1961, **50**(4): 104-5.

Bean seeds were irradiated with γ-rays ranging from 5,000 to 30,000 r. Dosages of 5,000 to 16,000 r. produced a number of plants with improved vigour, yield and earliness, but dosages above 16,000 r. were lethal.

6324. ANON.
Use a firming wheel.
Amer. Veg. Gr, 1961, **9**(3): 16, 18, illus.

The use of an 8-in. diameter wheel with a 1-in. diameter semi-pneumatic tyre, attached to a bean planter to press the seed into the furrow, has resulted in earlier emergence and more uniform seedling growth of snap beans.—Md agric. Exp. Stat.

6325. GARTNER NICHOLLS, A., AND CARDONA ÁLVAREZ, C.
Tamaño de parcela y número de replicaciones para experimentación en fríjol. **(Plot size and number of replications for experiments with beans.)**
Agric. trop., Bogotá, 1960, **16**: 572-4.

The most suitable plot size was 2 rows of 4 m. length (the smallest size tested). Extending the 2 rows to 6 or 8 m. gave slightly less accurate results, and increasing the row number to 4, 6 or 8, or the row length to 10 m. led to greater inaccuracy. The optimal number of replications varied with the season, but was most frequently 4.

6326. HOLLE, M., AND PEIRCE, L. C.
Plot technique for field evaluation of earliness, pod number, and total yield in the lima bean.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 403-8, bibl. 4.

The optimum plot sizes for determining the total yield, the number of pods and earliness were 15·0, 26·2 and 21·4 sq. ft., respectively. Single or double row plots were approximately equal in efficiency for the number of pods and earliness, but a single row plot was required to satisfy the optimum plot requirements for total yield. Earliness data showed low coefficients of variability in all combinations of plot and block dimensions, indicating that the number of days to the first flower was a precise measurement of earliness. The data further suggested that no replication was required to measure earliness, but extensive replication was necessary for effective evaluation of the total yield and number of pods. [From authors' summary and conclusions.]—Ia St. Univ., Ames.

6327. WHEELER, A. W.
Leaf-growth substance from dwarf french bean leaves.
A.R. Rothamsted exp. Stat., 1960, 1961, p. 100, bibl. 1.

The gibberellin-like growth-substance extracted from the primary leaves of dwarf french bean seedlings promoted leaf expansion and had properties corresponding to those of Bean Factor II, known as GA_5. Its accumulation in the primary leaves was increased by removing the growing point of the stem. There was some evidence that the cotyledons were the original repositories for this substance, which could be leached from them by soaking the seed in water. [See also *H.A.*, 30: 5440.]

6328. DOW, A. I.
1960 tests with beans.
Ext. Circ. Wash. St. Univ. **316**, 1960, pp. 3.

At 3 sites out of 4 field beans on soils low or very low in P and K showed large yield increases in response to P applications up to 300 lb. P_2O_5 per acre. No response was shown to K application, however, and high rates even reduced yields in some cases. A broadcast application of P ploughed in before sowing gave higher yields than a side dressing a month after sowing.

6329. DANILOVA, T. A., AND DAVYDOVA, E. N.
The effect of cobalt on plants. [Russian.]
Doklady Akad. Nauk SSSR, 1961, **137**: 1470-3.

Co was applied by different methods to various crop plants. Beans in sand culture receiving Co at 0·001, 0·005 and 0·05 mg./kg. were taller, better developed and showed greater physiological activity than the controls. The 2 higher rates were more beneficial than the lowest rate.

6330. BURTON, J. C., ALLEN, O. N., AND BERGER, K.C.
Effects of certain mineral nutrients on growth and nitrogen fixation of inoculated bean plants, *Phaseolus vulgaris* L.
J. agric. Food Chem., 1961, **9**: 187-90, bibl. 16, illus.

In greenhouse sand cultures growth, yields and N fixation of effectively inoculated plants were greatly enhanced by high levels of P, K, Ca and Mg. The beneficial effects of high levels of these nutrients were most pronounced when the plants were grown in the presence of moderate amounts of inorganic N. Symbiotic N fixation was also increased by the presence of 200 p.p.m. of combined N in the sand cultures. Increased levels of the nutrients did not improve N fixation in bean plants nodulated by ineffective rhizobia, regardless of the presence or absence of inorganic N. High levels of the nutrients were favourable to the uptake of added N by both inoculated and non-inoculated plants. [Authors' abstract.]—Univ. Wis., Madison.

6331. EMMERT, F. H.
Efflux and retention of foliar applied phosphorus-32 and sulfur-35 by intact bean roots, and the influence of various ambient ions on this relationship.
Plant and Soil, 1961, **14**: 33-42, bibl. 23.

In very approximate terms, for every 1 × 10^6 atoms of P^{32} and S^{35} applied to the leaves, only 1 × 10^4 appeared in the root and only 1 × 10^2 atoms were lost from the root. Calculated as a percentage of the original root activity, the quantity lost seldom exceeded 1. The loss of P^{32} from the roots was conditioned by the various ions in the nutrient solution. In order of decreasing influence these ions were Mg, Cl, NO_3, SO_4, K and NH_4. Root loss of S^{35} was not altered by the growth solution ions. The ion concentration in the nutrient solution also influenced the P^{32} root loss; in all cases the greatest loss occurred at the high concentrations. No concentration effect on the S^{35} root loss was noted except for Mg where the greatest loss occurred at low concentrations.—Storrs Exp. Stat., Conn.

6332. Cline, J. F., and Hungate, F. P.

Accumulation of potassium, cesium^{137}, and rubidium^{86} in bean plants grown in nutrient solutions.

Plant Physiol., 1960, **35**: 826-9, bibl. 15, illus.

Adding K to the nutrient substrate reduced Cs^{137} and Rb^{86} uptake by bean plants less than expected from an assumed physiological equivalence of these ions. The plants discriminated against Cs and Rb at low K nutrient concentrations, but with an increasing concentration of substrate K this discrimination diminished. Some toxicity was noted when significant quantities of non-radioactive Cs were present in the nutrient solution. [From authors' summary.]—G.E.C., Hanford Labs, Richland, Wash.

6333. Sistrunk, W. A., and others.

Effect of irrigation, mulch and time of harvest on certain chemical and physical changes in fresh and processed green beans.

Proc. Amer. Soc. hort. Sci., 1960, **76**: 389-96, bibl. 19.

Irrigation, mulching and time of harvest all affected the chemical and physical characteristics. In fresh beans the reducing and total sugars were lower in beans from non-mulched plots irrespective of irrigation. No differences due to field treatment were found in the starch, pectin and alcohol-insoluble-solids fractions. The starch and pectate-pectinates contents were lower in beans from the last harvest than from the second harvest. In canned beans the percentage of water-soluble constitutents was lower in beans from mulched plots, and the percentage of sloughed skins was higher in beans from the last harvest and from non-irrigated plots. [From authors' summary.]—Ore. St. Coll., Corvallis.

6334. Smith, C. R.

Mechanical bean harvesting in Florida.

Proc. Fla St. hort. Soc., 1960, 1961, **73**: 117-19.

A discussion of problems limiting mechanization.

6335. Klesser, P. J.

The virus diseases of beans.

Bothalia, Pretoria, 1961, **7**: 521-58, bibl. 60, illus.

Symptoms, transmission, host range (including *Phaseolus*, *Vicia* and *Pisum* spp.) and other details are given of 4 viruses and their several variants and of 1 virus complex. There is also some brief information on inactivation.

6336. Resconich, E. C.

Heat-induced susceptibility to tobacco mosaic virus and thermal injury in bean.

Virology, 1961, **13**: 338-47, bibl. 11, illus.

Heating attached bean leaves to various temperatures between 40° and 55° C. caused earlier and larger lesions in greater number on TMV-inoculated plants and also increased photosynthesis. Prolonged heat treatment caused injury to the plastids and cytoplasm. The interrelationships of these 4 phenomena are discussed.—Univ. Notre Dame, Ind.

6337. Nilsson, L.

Fettfläcksjuka på bönor. En litteratursammanställning och en experimentell undersökning. **(Halo blight of beans. A literature review and an experimental investigation.)** [English summary 2 pp.]

Medd. Växtskyddsanst., Stockh., 1960, **11**(76): 375-444, bibl. 136, illus.

The susceptibility of 29 bean varieties to *Pseudomonas medicaginis* f. sp. *phaseolicola* was studied in the field. Seed disinfection with fungicidal materials or hot-water treatment were not satisfactory, and the best control was obtained by bordeaux sprays. A 1% solution should be applied at intervals of 10 days, starting soon after germination.

6338. Thayer, P. L., and Ozaki, H. Y.

Effect of fungicide drenches applied in the furrow at planting time on control of damping-off of snap beans.

Proc. Fla St. hort. Soc., 1960, 1961, **73**: 200-3, bibl. 7.

Of 6 treatments applied at sowing D113 + captan gave the best results, reducing damping-off (caused mainly by *Rhizoctonia solani* and *Pythium* spp.) for 2 weeks and improving the plant stand. Yields were not improved by any of the treatments.—Everglades Exp. Stat., Belle Glade, and Plantation Field Lab., Fort Lauderdale.

6339. Casarini, B., Quaglia, A., and Silvestri, G.

La peronospora del fagiolo di lima. **(Downy mildew of lima beans.)**

Reprint from *Phytopath. medit.*, 1960, **1**: 47-8, illus.

Phytophthora phaseoli has appeared on lima beans in Italy. The best control has been given bv maneb at 0·2–0·25%. Copper fungicides and zineb proved less effective and more injurious to the crop.

6340. Smale, B. C., and Mitchell, J. W.
Control of lima bean downy mildew with phenacridane chloride and closely related compounds.
Plant Dis. Reptr, 1960, **44**: 684-6, bibl. 3.

In greenhouse trials complete control of the disease (*Phytophthora phaseoli*) on lima beans was obtained with a 63 p.p.m. spray of 9-(p-*n*-hexyloxyphenyl)-10-methyl-acridinium chloride or several closely related compounds.—U.S.D.A., Beltsville, Md.

6341. Ascher, K. R. S., and Cwilich, R.
Laboratory evaluation of acaricides against *Tetranychus telarius* L. on sugar beet and on beans.
Ktavim, 1960, **10**: 159-63, bibl. 4.

Of 13 acaricides tested Kelthane, parathion and Dimecron-Combi (contents given as Phosphamidon plus other component(s)) gave good control of the mite on beans when applied at 50 and 100 p.p.m. At 250 p.p.m. Phosphinon, Trithion and Guthion were also effective.

6342. Chant, D. A.
An experiment in biological control of *Tetranychus telarius* (L.) (Acarina: Tetranychidae) in a greenhouse using the predacious mite *Phytoseiulus persimilis* Athias-Henriot (Phytoseiidae).
Canad, Ent., 1961, **93**: 437-43, bibl. 9.

P. persimilis quickly reduced *T. telarius* populations on beans to a very low level. On predator-free plants *T. telarius* caused severe damage. The attributes of the predator which determine its effectiveness are discussed. [From author's abstract.]—Canada Dep. Agric., Belleville, Ont.

6343. Vojvodić, R.
The effect of low temperature on the bean weevil (*Acanthoscelides obtectus* Say).
[Yugoslav, with English summary ⅓ p.]
Letopis nauč. Rad., Novi Sad, 1959, **3**: 68-72, bibl. 3.

Maintaining infested bean seeds at –4° C. for 3 days killed the adults, and treatment for 10–15 days killed the larvae without affecting seed viability.

6344. Vojvodić, R.
The effect of insect powder on the bean weevil, *Acanthoscelides obtectus* Say.
[Yugoslav, with English summary ½ p.]
Letopis nauč. Rad., Novi Sad, 1958, **2**: 44-9, bibl. 3.

Pyrethum dust applied at 1 and 5 mg. per 100 g. of infested bean seed did not control the weevil, but at 10 and 25 mg. partial control was obtained, and at 50 and 100 mg. both the eggs and the newly hatched larvae inside the beans were at first paralysed and then died.

6345. Baranowski, R. M.
A report on the use of systemic insecticides on some vegetable crops.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 166-8.

Granular 10% Dimethoate at 3·0 or 4·5 lb. a.i. per acre, mixed with the fertilizer and placed in a band 4 in. from the seed, protected the primary leaves of pole beans from leaf miners (*Liriomyza pusilla*).—Sub-trop, Exp. Stat., Homestead.

6346. Way, M. J., and Heathcote, G. D.
Effect of plant density on infestation and control of *A*[*phis*] *fabae* on beans.
A.R. Rothamsted exp. Stat. 1960, 1961, p. 150.

In each of 2 localities where beans were sown in rows 22 in. apart, a spacing of under 10 plants per yard of row gave an aphid infestation slightly below the maximum, which was reached at 15 and 13·2 plants per yard in the 2 localities respectively. With still closer spacings the infestation and subsequent build-up of population were progressively smaller.

6347. Way, M. J.
Effects of insecticides on beneficial insects.
A.R. Rothamsted exp. Stat. 1960, 1961, pp. 148-9.

In experiments on the control of *Aphis fabae* on beans many predatory coccinellid and syrphid larvae were killed by Mevinphos (Phosdrin) at ½ the recommended rate, and some coccinellid larvae by demeton and demeton-methyl at ⅓, and Menazon (PP175) at ⅔ of the recommended rate. Less harm was done by fluoroacetamide at the recommended rate. Demeton-methyl at 2 oz./acre gave good control of the aphids, but demeton at 1 oz./acre was inadequate. Tests suggested that demeton-methyl and Mevinphos may kill some bees working the crop at the time of spraying.

6348. Bowman, J. E., and Walker, D. G.
Action of *Vicia faba* on erythrocytes: possible relationship to favism.
Nature, 1961, **189**: 555-6, bibl. 8.

Medical study on haemolytic anaemia caused by eating broad beans.

Legumes—peas.

(*See also* 5654, 5661, 5664, 5671, 5672, 5674, 5692, 5699, 5701, 5734, 6251, 6467, 6669.)

6349. Ministry of Agriculture, London.
Peas for drying.
Adv. Leafl. Minist. Agric., Lond., **357**, 1960, pp. 8, illus.

Culture of marrowfat, Large Blue and Lincoln Small Blue peas.

6350. Carter, M. V.
Fusarium wilt of peas.
A.R. Rothamsted exp. Stat. 1960, 1961, pp. 125-6.

Certain hybrids of the pea varieties Greenfeast (=Lincoln) × New Era have proved resistant to *Fusarium oxysporum* f. *pisi* race 1.

6351. Tiščenko, A. N.
Variability in the pea variety Torsdag. [Russian.]
Agrobiologija, 1960, No. 5, pp. 785-6.

Seeds of the variety Torsdag from 6 different centres were grown together, and it was found that plants of the different batches matured as much as 14 days apart. The batches also varied in the number of leaves developing before the first flower and in the total crop and size of seeds.

6352. Knavel, D. E.
Part I. Beta and gamma radiation studies in *Pisum sativum*. Part II. The inheritance of fusarium root-rot, *Fusarium solani pisi*, resistance in *Pisum sativum*.
Diss. Abstr., 1961, **21**: 2428-9, being *L.C. Card. No. Mic.* 60-6960 of 92 pp.

Gamma irradiation of dry seeds reduced germination and increased the numbers of plants showing dwarfing, leaf distortion and leaf variegation in the R_1 populations to a greater extent than beta irradiation. Soaking seeds in chemical solutions (colchicine, Endothal or uranyl nitrate) before irradiation from either source did not cause any appreciable increase in the variability of R_2 plants. Soaking seeds in water before γ-irradiation, however, was more effective that γ- or β-irradiation of dry and chemically-soaked seeds for inducing mutations in the R_2 populations. No R_3 plants were found which were resistant to *Fusarium* root-rot. In a study of the mode of inheritance of resistance to *Fusarium*, resistance was shown to be dominant. There were no indications of linkage to seed shape or coat colour, but plants with short-internode type growth (similar to Early Perfection) were slightly more resistant than those with long-internode type growth (similar to the introduced variety 140165).—Mich. St. Univ.

6353. Paton, D. M.
Quantitative criteria for flower initiation in a late variety of pea.
From abstr. in *Aust. J. Sci.*, 1960, **22**: 478.

Values for the node position and time of initiation of the first flower followed a complicated photoperiod-temperature interaction. Delayed flowering at high temperatures in short days was closely associated with shrivelling of the basal leaves. The time of initiation of the first flower is the time taken for the green leaves to increase to a number determined mainly by the plastochron interval and the photoperiod.—Univ. Tasmania, Hobart.

6354. Murfet, I. C., and Barber, H. N.
Effects of gibberellic acid and allogibberic acid on flowering and internode-length in *Pisum sativum*.
Nature, 1961, **191**: 514-5, bibl. 7.

The results of preliminary tests of methyl gibberellate, gibberellin C, gibberellenic acid, gibberic acid and allogibberic acid are briefly given. Extended tests comparing gibberellic acid with allogibberic acid combined with 2 photoperiods are also described. Both acids caused a delay in flowering but allogibberic acid had no effect on stem length. The chemical and functional implications are briefly discussed.—Univ. Tasmania, Hobart.

6355. Kwack, B. H.
Effects of light intensity and quality on plant maturity.
Diss. Abstr., 1961, **21**: 1725-6, being *L.C. Card No. Mic.* 60-4450 of 146 pp.

In preliminary experiments the highest yields (dry weight of pods and number of seeds per plant) of Little Marvel peas were obtained with red light, and, under conditions of equal intensity, lesser yields with blue, incandescent, pink, warm white, and yellow (in that order) and the least with green light. Yields per plant increased with the intensity of the various light qualities, whereas yields per lumen decreased as the intensity increased beyond certain levels. Tests of light qualities in combination or alone showed that warm white plus incandescent light or warm white alone resulted in the highest yields, whereas green gave the lowest yields. The influence of light on yields per lumen was greatest with red plus blue, and least with green light. Among single light qualities tested the highest yields per lumen were obtained with red, and lesser yields with blue, incandescent, pink, warm white, yellow (in that order) and the least with green light. The addition of incandescent to fluorescent light usually resulted in a higher yield than when either of these lights was used alone.—Univ. N.H.

6356. Anon.
New use cleared for Dowpon—grass control in peas.
Down to Earth, 1961, **16**(4): 12.

A solution of Dowpon (1 lb./acre) applied at least 25 days before harvesting the peas will eliminate grass seedlings and may be combined with Premerge (2 qt./acre) to control both grasses and other weeds.

6357. Hutchinson, F. E., Murphy, H. J., and Gausman, H. W.
Relationship of phosphorus, potassium and calcium to yield of shelled peas in central Maine.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 470-4, bibl. 6.

A 5-year study was conducted to evaluate the effects of P, K and Ca on pea yields, and the resulting data were subjected to multiple regression analyses. The regression analyses were significant for the years 1951, 1952 and 1954. Recoverable P_2O_5 had a significant effect on yield for the 3 seasons, with P_2O_5 mean values in lb. per acre ranging from 73 in 1961 to 100 in 1954. Recoverable K_2O had a significant effect on yield for the seasons 1951 and 1952, with K_2O means values ranging from 93 lb. in 1951 to 127 lb. in 1954. The maximum effective level of K_2O was between 115 and 127 lb. per acre. Recoverable CaO had a significant effect on pea yields for the 1951 season only, with CaO mean values ranging from 949 to 1,489 lb. The maximum effective level was between 949 and 1,157 lb. per acre. The levels of P_2O_5, K_2O and CaO were higher each successive season, indicating that levels of fertility were progressively increased during the time the study was conducted. [Authors' summary.]—Univ. Maine, Orono.

6358. Richardson, L. T.

Effect of insecticide-fungicide combinations on emergence of peas and growth of damping-off fungi.

Plant Dis. Reptr, 1960, **44**: 104-8, bibl. 12, illus.

Pea seeds treated with commercial preparations of aldrin, dieldrin or lindane, singly or in combinations with thiram, captan or chloranil, were planted in sterile sand artificially inoculated with *Pythium ultimum* or *Rhizoctonia solani*. Seeds treated with insecticides alone were more vulnerable to pre-emergence damping-off than untreated seeds, whereas seeds treated with insecticide-fungicide combinations were better protected than those treated with fungicides alone. In the absence of damping-off pathogens none of the seed treatments had any effect on seedling emergence.—Canada Dep. Agric., London, Ont.

6359. Davey, C. B., and Papavizas, G. C.

Aphanomyces root rot of peas as affected by organic and mineral soil amendments.

Phytopathology, 1961, **51**: 131-2, bibl. 8.

An oat amendment was most effective in reducing the disease (*A. euteiches*). N, especially as NH_4NO_3 at 300 lb. N per acre applied 2 days after sowing the peas, and maize, rye and soya bean amendments also substantially reduced the rot.—Agric. Res. Serv., U.S.D.A., Beltsville, Md.

6360. Dolliver, J. S.

The role of the host plant in population changes of *Pratylenchus* spp.

Diss. Abstr., 1961, **21**: 1698-9, being *L.C. Card No. Mic.* 60-6461 of 125 pp.

Pratylenchus populations (chiefly *P. penetrans*) on pea roots were limited by defoliation and scalding of the stem, which restricted root growth severely. Treatments causing moderate restriction of plant growth, however, resulted in higher nematode numbers per root system than were present on untreated plants. Nematode numbers on peas grown in sand with tap water were double those on comparable plants given nutrients. Greenhouse-grown plants from which pods were removed had larger root systems and fewer nematodes than did control plants. Under controlled conditions of temperature and light the lowest nematode numbers were found where plant growth was best.—Cornell Univ.

6361. Grinevič, M. I.

Drastic measures against the pea weevil. [Russian.]

Zašč. Rast. Vred. Bolez., 1960, **5**(8): 14-15.

In the Vinički region pea crops show 40–50%, and occasionally 80%, infestation by the pea weevil. The most effective control treatment consisted of dusting with DDT at 18–20 kg./ha. at the appearance of the first flowers, followed by a second application of 15–17 kg./ha. 7–8 days later. This treatment reduced the degree of infestation from 26·3% to an average of 3·5%. In view of the great economic importance of the pest, recommendations are made for mass control, including seed fumigation. [For earlier work see *H.A.*, 31: 4510.]

Lettuce and other salad crops.

(*See also* 5613, 5618, 5621, 5654, 5662, 5743, 5775, 6238, 6239, 6668, 6672.)

6362. Jenkins, J. M., Jr.

No new varieties from irradiated lettuce seed.

Res. and Fmg, N.C., 1960, **18**(4): 13.

Seed of Great Lakes lettuce was irradiated with thermal neutrons for 9, 12 and 15 hours and by gamma rays at 15,000, 20,000 and 25,000 r. Plants grown from seed receiving the lower dosages of both types of irradiation were from ⅓ to ½ the normal size, deformed, and susceptible to downy mildew. Seeds receiving high dosages did not survive.

6363. Sheard, G. F.

Irradiation of lettuce during propagation.

Exp. Hort., 1961, No. 4, pp. 71-2.

Supplementary lighting with H.P. mercury vapour lamps during propagation advanced the maturity of the glasshouse lettuce Cheshunt 5 B by 9 days. Treated plants, however, had smaller heads and were more prone to *Botrytis* attack and tip-burn.—Fairfield exp. Hort. Stat.

6364. Nelder, J. A.

The spacing of lettuce in Dutch light frames and cold structures.

Exp. Hort., 1961, No. 4, pp. 20-30, bibl. 1.

In several spacing experiments with May Queen and May Princess it was shown that where growing conditions were conducive to a heavy crop the optimum spacing was closer than where conditions were less favourable. In 5 of 6 experiments involving the widest range of spacings, the proportion of plant losses from *Botrytis* and slugs did not increase with population density. Changes in spacing above 7½ in. square had little effect on the average cutting date. Market values in all experiments reached a maximum at a spacing of about 7 in. square, and relative profits were highest at about 7½ in. square. [For earlier work on spacing in glasshouses see *H.A.*, 26: 3805.]—Nat. Veg. Res. Stat., Wellesbourne.

6365. Smith, F. G.
Uncovering dates for frame grown lettuce.
Exp. Hort., 1961, No. 4, pp. 1-7, illus.

Six varieties of lettuce growing in Dutch light frames were uncovered at 10-day intervals. In general, early uncovering delayed the cutting date and reduced the marketable yield.—Stockbridge House exp. Hort. Stat.

6366. Fröhlich, H., and Henkel, A.
Weitere Ergebnisse zur Frage der Zusatzberegnung bei Freilandsalat auf leichten Böden. **(Further results on the problem of supplementary irrigation of field-grown lettuce on a light soil.)** [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1961, **9**: 139-61, bibl. 31, illus.

In 4 years' irrigation trials 60–70% of field capacity was found to maintain optimum conditions for growth at all stages. Soil moisture contents above and below this level caused yield reductions. The optimum range of soil moisture for early head lettuce was similar to that required by a summer crop. Comparisons between irrigation applied by night and by day showed that night irrigation may favour yields, particularly in extremely dry periods, although in some cases there were no significant differences between day and night irrigation.—Inst. Gartenb., Grossbeeren.

6367. Roorda van Eysinga, J. P. N. L., and van der Boon, J.
Stikstofwerking van stalmest en stikstofbemesting van sla onder glas. **(The effect of nitrogen in farmyard manure and nitrogen manuring of lettuce under glass.)**
Reprint from *Stikstof*, 1960, No. 28, pp. 174-81, bibl. 6, illus.

The optimal level of N for spring lettuce yields averaged 0·9 kg. N/are. FYM at 300 kg./are had relatively little effect on the amount of artificial N fertilizer required.

6368. Zink, F. W., and Kimble, K. A.
Effect of time of infection by lettuce mosaic virus on rate of growth and yield in Great Lakes lettuce.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 448-54, bibl. 4.

Great Lakes lettuce was infected with the virus of common mosaic of lettuce at 3 stages of growth. Growth curves of control and infected plants showing the effect of the virus on the growth rate are presented. The earlier the infection, the higher the percentage of stunted, malformed and non-heading plants. Percentage reductions in mean weight per plant at harvest and mean weight per marketable head were largely dependent on, and in proportion to, the stage of plant development at the time of inoculation. Extensive infection at an early stage renders the crop unmarketable, and infection as late as 20 days before harvest may reduce the economic value of the crop. [Authors' summary.]—Univ. Calif., Davis.

6369. Duffus, J. E.
Two viruses that induce symptoms typical of "June yellows" in lettuce.
Plant Dis. Reptr, 1960, **44**: 406-8, bibl. 3, illus.

Aphid transmission tests with 4 lettuce varieties affected with "June yellows" produced typical radish yellows symptoms in radish and sugar-beet hosts and typical malva yellows symptoms in *Malva parviflora* and shepherd's purse (*Capsella bursa-pastoris*).

6370. Barr, J. T.
Isolation of *Olpidium brassicae* from roots of lettuce showing big-vein symptoms.
Plant Dis. Reptr, 1960, **44**: 617, bibl. 1.

6371. Mitchell, A. P.
Lettuce needs two workers to cut for each packer.
Grower, 1961, **55**: 1260-1, illus.

Timings taken of cutting, grading and packing lettuce showed that the most efficient distribution of labour was 2 people to cut for each packer. Well-grown lettuces need less selection and trimming, and by growing in the Fernhurst Bed system (6 ft.-wide beds) box handling and carting is accelerated.—Plant Protection Ltd., Fernhurst.

6372. Peeters, L.
Grondbewerkingen en zaaien van witloof. **(Soil preparation and sowing of chicory.)**
Tuinbouwberichten, 1961, **25**: 107-9.

Notes are given on rotations, soil preparation, manuring (no N, but P, K and Mg), sowing rates and depths, and weed control with chlorpropham.

6373. Bernard, J.
Essais préliminaires de lutte estivale contre les mouches de la chicorée. **(Preliminary tests for summer control of chicory flies.)**
Meded. LandbHogesch. Gent, 1959, **24**: 994-1004, from abstr. in *Z. PflKrankh.*, 1961, **68**: 381.

Napomyza lateralis and *Ophiomyia pinguis* on chicory were not satisfactorily controlled by spraying with dieldrin during the flight of the adults, or by demeton sprays applied at the start of larval feeding.

6374. Anon.
Watercress packing mechanized.
Fm Mechaniz., 1961, **13**: 59, illus.

By using a Dexion slotted steel conveyor which passes the packed chips through a hydro-cooling tank.

Mushrooms.

(*See also* 7287.)

6375. Robbins, W. A., and Taylor, W. S.
70-2 mushroom.
M.G.A. Bull., 1961, No. 135, pp. 98-100, bibl. 1, illus.

A new cream-coloured strain producing considerably larger mushrooms and giving somewhat higher yields than the commonly grown white strains.

6376. Edwards, R. L.
Air, water and the mushroom.
M.G.A. Bull., 1961, No. 135, pp. 115-24.

A general article on CO_2 removal from, and moisture control in, houses and beds.

6377. Flegg, P. B.
The natural accumulation of soluble salts in the casing layer of mushroom beds.
J. hort. Sci., 1961, **36**: 139-44, bibl. 3.

This occurs even in the absence of mushroom mycelium and appears to be a physical process depending on the rate of evaporation from the surface, and the supply of salts in the underlying compost. It is, however, unlikely to affect the crop.—Glasshouse Crops Res. Inst., Littlehampton.

6378. Flegg, P. B.
The effects of adding soluble salts to the casing layer on the yield and size of cultivated mushrooms.
J. hort. Sci., 1961, **36**: 145-8, bibl. 6.

The results of 11 experiments show that, although the addition of common salt to the casing layer increases the average weight of the mushrooms, the yield is reduced. The practice cannot therefore be recommended except where the crop consists of a large number of small mushrooms. [See also *H.A.*, 31: 4557.]—Glasshouse Crops Res. Inst., Littlehampton.

6379. Merek, E. L.
A study of the mummy disease of the cultivated mushroom, *Agaricus campestris* L. ex Fries.
Diss. Abstr., 1961, **21**: 1726, being *L.C. Card No. Mic.* 60-5448 of 64 pp.

Observations of 14 different infestations did not indicate that any specific commercial growing practices could be associated with the disease. It was not possible to isolate any organism from affected material which would induce the disease under artificial conditions. Initial experiments indicated that water infusions from infected soil or compost could induce the production of open-veiled mushrooms, but this effect was not substantiated in later experiments.—Pa St. Univ.

6380. Lohwag, K.
Mumienkrankheit des Kulturchampignons. **(Mummy disease of cultivated mushrooms.)**
[English summary 6 lines.]
PflSch. Ber., Wien, 1961, **26**: 107-11, bibl. 9, illus.

The cause could not be discovered, but it is suggested that the CO_2 concentration within the compost and the nature of the casing soil are important factors.—Hochsch. Bodenkultur, Wien.

Okra.

(*See also* 5738, 6257, 6905.)

6381. Sistrunk, W. A., Jones, L. G., and Miller, J. C.
Okra pod growth habits.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 486-91, bibl. 4, illus.

In studies over 2 years on 3 varieties and 2 lines of okra the greatest increase in pod weight, length and diameter occurred during the 4th to 6th day after flowering; at this stage quality was also highest in all the varieties. The dry matter content of the pods of all 5 varieties declined from about 13% 3 days after flowering to 8–9% 8–9 days after flowering; thereafter it rose steeply and all varieties became so fibrous as to be inedible by the 10th day after flowering. The short-podded varieties remained suitable for freezing whole over a slightly longer growth period than the long-podded varieties.—La agric. Exp. Stat., Baton Rouge.

6382. Rao, K. R. N.
Control of the vein clearing disease of bhendi [*Hibiscus esculentus*] with systemic chemicals.
South Indian Hort., 1959, **7**: 15-19, bibl. 2.

Although none of the preparations tested gave complete control of the virus, disease incidence was uniformly low when Systox and Folidol were applied to control the vector, *Bemisia tabaci*. Yields were appreciably greater on all treated plots.

Onions and related crops.

(*See also* 5654, 5705, 6239, 6242, 7287.)

6383. Kennelly, A. G.
Vegetable growing for home and commercial gardeners: onions.
N.Z. J. Agric., 1961, **102**: 137-45, bibl. 1, illus.

Culture, varieties, diseases and pests and their control.

6384. Hemy, C. D.
Onion production.
Bull. Minist. Agric. Tanganyika **2**, [1961], pp. 12, illus.

Culture, storage, pests and diseases.

6385. King, E. M.
Storage onion production in British Columbia.
Hort. Circ. B.C. Dep. Agric. **90**, 1961, pp. 6, illus.

6386. Savcenko, N. A.
Selection of onions by the free intervarietal crossing method. [Russian.]
Agrobiologija, 1961, No. 1, pp. 68-72, bibl. 1.

By allowing free intercrossing between a few chosen varieties, a seedling was produced which gave earlier and higher yields than the standard regional varieties Kaba, Ispanskij [Spanish] and Strigunovskij. The bulbs of the new seedling had high total sugar and vitamin C contents and developed less neck rot in storage than the other varieties.

6387. Nichols, C. G., Larson, R. H., and Gabelman, W. H.
Relative pink root resistance of commercial onion hybrids and varieties.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 468-9, bibl. 4.

Among 33 onion hybrids and varieties tested for resistance to *Pyrenochaeta terrestris* a few southern, short-day types showed high or moderate resistance, but all northern types were susceptible.—Wis. agric. Exp. Stat.

6388. Saha, S. B.
Fasciation in the flowering scape of *Allium cepa* Linn.
Sci. and Cult., 1961, **27**: 88-9, bibl. 8, illus.

6389. Smith, F. G.
Cultural treatments affecting the production of onions from sets.
Exp. Hort., 1961, No. 4, pp. 31-40, bibl. 1.

Variety trials showed that Big Ben and Stuttgarter Riesen had little tendency to bolt when grown from sets. The highest yields were produced by Best of All. High temperature (73°–83° F.) storage reduced bolting in all varieties, and in sets below $\frac{3}{4}$ in. in diameter bolting was negligible. Yields were highest at the closest spacing (2 in. between the sets and 22 in. between the rows), but the bulbs were smaller and there was a slight tendency for the number of bolters to increase.—Stockbridge House exp. Hort. Stat.

6390. (Ruf, R. H.)
Fertilizer trials.
Amer. Veg. Gr, 1961, **9**(5): 18.

Onions given 50 lb. N/acre at sowing in March and 100 lb. N/acre as a side-dressing in mid-June yielded 29·4 tons/acre. Yields were similar on plots where 100 lb. N was applied at sowing. Control plots produced 5·8 tons.—Univ. Nev., Reno.

6391. Paterson, D. R., Blackhurst, H. T., and Siddiqui, S. H.
Some effects of nitrogen and phosphoric acid on premature seedstalk development, yield and composition of three onion varieties.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 460-7, bibl. 10.

In 1957 and 1958 3 × 3 × 3 N, P and S factorial experiments were carried out on 3 onion varieties with N applied at 0, 50 and 100 lb./acre, P_2O_5 at 0, 50 and 100 lb. and S at 0, 25 and 50 lb. S had no significant effect on yields. P increased the yields of both marketable and cull onions in both years. N increased the yield of marketable onions and decreased that of cull onions in 1957, but evoked no clear-cut response in 1958 when growing conditions were relatively poor. In 1957 the application of N increased the N content of the bulbs and decreased their P content; P_2O_5 at 50 lb./acre produced a highly significant increase in the P content of the bulbs. The 100-lb. rates of both N and P_2O_5 significantly increased the K content of the bulbs. The different onion varieties showed significant differences in their N, P and K contents and also in their yields. The results also indicated that the application of relatively high amounts of N, placed directly under the plant rows, might help to minimize premature seed-stalk development.—Tex. agric. Exp. Stat., College Station.

6392. Hall, B. J.
Growing weed-free onion crops.
Agric. Gaz. N.S.W., 1961, **72**: 23-5.

Herbicide recommendations [see also *H.A.*, 31: 4593].

6393. Janýška, A.
Herbicidy v kulturach cibule, mrkve a petržele. **(The use of herbicides in onions, carrots and parsley.)**
Věd. Práce výzk. Úst. zelin. ČSAZV, v Olomouci, 1961, No. 1, pp. 119-29, bibl. 20.

On a heavy loam soil trials were carried out in 1958 and 1959 with the following herbicides: Alisan (potassium cyanate), Nitrosan (25% DNOC-sodium), dinoseb (20%), Prevenol 56 (25% chlorpropham) and Prevenol-Spezial (chlorpropham + monuron). In carrots and parsley the best results were obtained with a pre-emergence application of Prevenol 56 at 16 l./ha. in a volume of 800 l./ha. Yields were increased by 30–40% compared with the untreated control. The same material at 12 l./ha. also gave the best results in onions, increasing the yield by 91% compared with the untreated control and giving a low percentage of bull-necked bulbs.—From *Weed Abstr.*, **10**, No. 462.

6394. Comin, D.
Maleic hydrazide seems effective in reducing onion sprouting.
Ohio Fm Home Res., 1959, **44**: 78, illus.

MH at 4 lb./acre sprayed on onions 2 weeks before harvest considerably reduced sprouting during 10 months' storage.

6395. Date, W. B.
Effect of preharvest foliar sprays of maleic hydrazide on the cold storage behaviour of onions and garlic.
Food Sci., Mysore, 1960, **9**: 203-4, from abstr. in *J. Sci. Food Agric.*, 1961, **12**: i-277.

Plants were sprayed with 750, 1,000 and 1,500 p.p.m. MH 6 weeks before harvest. The onion and garlic bulbs were subsequently stored at 32–35° F. and 80–90% R.H. The higher dosages of MH had little depressant action on the respiration rate, and the onions showed 100% rooting within the first 2 months of storage, but the garlic bulbs showed no rooting during 180 days' storage.

6396. Gull, D. D.
Artificially curing Florida onions.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 153-6, bibl. 6.

Onions cured by a heated airblast at 110° F. for 20 hours kept substantially better for 12 weeks than non-cured bulbs. The best results were obtained by curing followed by storage at 55° F. Poor keeping varieties benefited more from curing than good keepers, and onions grown on mineral soil stored better than those grown on organic soil. Soft rot was controlled by a 5 min. dip in 1% dehydroacetic acid.—Agric. Exp. Stat., Gainesville.

6397. Mariën, A.
Variëteitenonderzoek bij prei. (**Leek variety trials.**)
Tuinbouwberichten, 1961, **25**: 51-3, illus.

The varieties recommended are Elboeuf for early harvesting in June–July, Elboeuf, Noordpool and Goliath for harvesting during September–December and Blauwe van Solaize, Noordpool and Winterreus (Hollandia) for harvesting after the winter.

6398. Parkinson, D., and Clarke, J. H.
Fungi associated with the seedling roots of *Allium porrum* L.
Plant and Soil, 1961, **13**: 384-90, bibl. 6.

The genera most strongly represented were *Cylindrocarpon*, *Fusarium* and certain sterile forms. The percentage colonization and the ecological composition of the rhizoflora varied in different soils especially as a result of varying soil pH.

6399. Aycock, R., and Jenkins, J. M., Jr.
Methods of controlling certain diseases of shallots.
Plant Dis. Reptr, 1960, **44**: 934-9, bibl. 10, illus.

Pre-planting treatment of *Botrytis*-infected bulbs with Dowicide B($1\frac{3}{4}$ and 3 lb. per 100 gal.) for 25 and 15 min. respectively and captan (12 lb. per 100 gal.) for 25 min. gave yield increases of more than 50% over the control. Soil treatment with PCNB (50 lb. per acre) was often beneficial if conditions favoured the development of *Sclerotium rolfsii*. Drying the bulbs in the field for 6 days after harvest resulted in less loss in storage than when the bulbs were brought into storage immediately after harvesting and artificially dried at 100° F. for 6 days. Dipping dried bulbs in Dowicide B($1\frac{3}{4}$ lb. per 100 gal.) for 15 min. reduced the amount of black mould (*Aspergillus niger*) developing during storage.—Hort. Crops Res. Stat., Castle Hayne, N.C.

6400. Kulik, M. M., and Tims, E. C.
Screening of fungicides and chemotherapeutants for control of pink root of onions and shallots.
Plant Dis. Reptr, 1960, **44**: 379-82, bibl. 5.

Of the 29 chemotherapeutants used in pot tests none reduced the incidence of pink root (*Pyrenochaeta terrestris*) of onions to 1% or less, but this standard was achieved by 9 of the 50 fungicides tested, viz. Mema MN (1·5%, 40 p.p.m.), B.B. 67 (1·85%), and 200 p.p.m. solutions of Dithane [type not stated], Thioneb 50W, Pittsburgh B-1843, and four Omadine salts (Mn, disulphide, thiourea and Zn). The shallots were insufficiently diseased to give conclusive results. [See also *H.A.*, 29: 3722x.] —La St. Univ., Baton Rouge.

6401. Newhall, A. G., and Brann, J. L.
Onion smut control experiments with granule formulations in greenhouse and field.
Plant Dis. Reptr, 1960, **44**: 269-72, bibl. 5.

Urocystis cepulae in onion crops was successfully controlled under wet conditions by applying with the seed 30 lb./acre of attaclay granules containing 4% of active material of thiram, captan or Phaltan. —Cornell Univ., Ithaca, N.Y.

6402. Svešnikova, N. M.
A method of disinfecting garlic cloves to destroy nematodes. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(7): 34-5.

The following treatment was applied for the control of stem nematodes in garlic bulbs intended for planting. The bulbs were stored over winter at 1–3° C. Before planting, the separated cloves were soaked in water for 3 days, the water being changed daily. They were then dipped for 1–2 minutes in a 1:20 solution of formalin, and were planted at a depth of 20 cm. [sic.]. The treated cloves produced very sturdy plants and showed only about 9% infestation, whereas the plants from untreated cloves were all infested.

6403. Ministry of Agriculture, London.
Onion fly.
Adv. Leafl. Minist. Agric., Lond., **163**, revised 1960, pp. 3.

Delia antiqua damage and control.

6404. Perron, J. P., Finlayson, D. G., and Miller, L. A.
Control of the onion maggot.
Publ. Res. Branch Canada Dep. Agric. **935**, revised 1961, pp. 7, illus.

With hydrocarbon insecticides in the Atlantic and Prairie Provinces and with organophosphorous compounds in Ontario, British Columbia and Quebec.

6405. Sleesman, J. P.
Controlling onion maggot.
Amer. Veg. Gr, 1961, **9**(4): 16, illus.

Onions given granular formulations of organophosphorous insectides in the furrow at sowing yielded an average of 1,200 50-lb. bags per acre. Dieldrin-treated plots produced 280 bags, and control plots 100 bags.—Ohio agric. Exp. Stat., Wooster.

Rhubarb.

(*See also* 7287.)

6406. Frazier, W. A., and others.
Correlation between certain seedling and mature plant characters in rhubarb.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 492-4.

A few significant, though low, positive correlations were found.

6407. Loughton, A.
The effect of low temperature before forcing on the behaviour of rhubarb.
Exp. Hort., 1961, No. 4, pp. 13-19, bibl. 8.

The yield of forced rhubarb depends on the period of exposure to low temperatures before autumn lifting from the field. A simplified system of measuring accumulated cold units is given by which the optimum time for lifting may be determined. —Stockbridge House exp. Hort. Stat.

Root crops.

(*See also* 5603, 5618, 5660, 5661, 5663, 5775, 6238, 6241, 6393, 6672.)

6408. Kononkov, P. F., and Rabunec, N. A.
The action of organo-mineral mixtures on the yield of seeds of root vegetables. [Russian.]
Agrobiologija, 1960, No. 5, pp. 707-12.

Experiments with radishes, turnips, carrots and beetroots showed that organo-mineral mixtures consisting of compost or sewage sludge with superphosphate and lime slightly increased seed yields in all cases.

6409. Kelly, J. F., and Gabelman, W. H.
Variability in the tolerance of varieties and strains of red beet (*Beta vulgaris* L.) to boron deficiency.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 409-15, bibl. 9.

In 57 varieties and strains grown under B-deficient conditions in the field, the percentage of roots affected by black rot ranged from 0 to 76 depending on the variety or strain. Seedlings of the different varieties and strains growing in nutrient solution in the glasshouse showed no reaction to low B conditions.—Univ. Wis., Madison.

6410. Kelly, J. F., and Gabelman, W. H.
Variability in the mineral composition of red beet (*Beta vulgaris* L.) varieties in relation to boron nutrition.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 416-24, bibl. 12.

See *H.A.*, 31: 762.

6411. Keyworth, W. G., and Howell, J. S.
Studies on silvering disease of red beet.
Ann. appl. Biol., 1961, **49**: 173-94, bibl. 11, illus.

The disease is most prevalent on seed crops of the variety Cheltenham Green Top, but it also affects other varieties, often only mildly. About 1% of the seeds from infected plants contain the pathogen, *Corynebacterium betae*, and these seeds give rise to plants showing systemic symptoms. The bacteria spread from such plants in the seedling bed during the autumn and winter, probably entering other plants through their leaf edges. Such spread can occur to distances of at least 50 yards, and the planted out seed crop may be up to 75% infected. The disease is readily transmitted on knives which have cut infected roots. Seed treatment with 200–400 μg/ml. streptomycin or erythromycin gives almost complete control of the disease. Mercurial dusts are less effective but have been found of some value. [From authors' summary. See also *H.A.*, 27: 3523.]—Nat. Veg. Res. Stat., Wellesbourne, Warwick.

6412. Ėdel'štejn, V. I., and Kočetkov, V. P.
Methods of anchoring bands of paper mulch during mechanized sowing of carrots. [Russian, with English summary 4 lines.]
Izv. Timirjazev. sel'sk. Akad., 1961, No. 2, pp. 85-97, bibl. 2, illus.

Small plot experiments were carried out using 4 methods of anchoring bands of perforated mulch paper laid over drilled carrot seeds. Ridge sowing of the seed and anchoring the paper by covering it with soil only along the edges, leaving the perforations uncovered, gave the best seedling emergence and highest yields. Sowing on the flat, with the mulch again only covered by soil along the edges, was the next best method. The other 2 methods, in which the perforations were covered either with compost or soil, resulted in much lower seed germination and yields. In further trials with a combined machine, which drilled the seed, laid the paper mulch and covered the edges with soil, the results were erratic since the machine was unable to prevent the perforations being covered on some types of soil, and in these cases yields were reduced.

6413. Sagajdak, I. N.
Increase in the dry matter, sugar, pigment and enzyme content in grafted carrots. [Russian.]
Doklady Akad. Nauk SSSR, 1961, **136**: 237-40, bibl. 6, illus.

Grafting a supplementary root of one carrot variety on the root of another variety and *vice versa* increased the dry matter, sugar and pigment contents and increased enzyme activity in the leaves of the grafted plants compared with those of the corresponding ungrafted variety. Root analyses during winter storage also showed higher dry matter, sugar and pigment contents in both roots of the grafted plants than in ungrafted roots. [For similar work with beets see *H.A.*, 30: 729.]

6414. Yamaguchi, M., and Sugiyama, T.
The carotenoid contents of the Kintoki and Kokubu varieties of carrot grown in Japan. [Japanese summary $\frac{1}{5}$ p.]
J. hort. Ass. Japan, 1960, **29**: 310-12, bibl. 6.

Examination of the absorption spectra of the isolated pigments showed that the predominant pigment in Kokubu (orange rooted) carrots was β-carotene with $\frac{1}{6}$ as much α-carotene and small amounts of zeta-carotene and lycopene, whereas the main pigment in Kintoki (red rooted) carrots was lycopene, which was similar to that isolated from tomatoes and had no vitamin A value.—Univ. Calif., Davis, and Univ. Tokyo.

6415. Watson, M. A., and Serjeant, E. P.
Carrot motley dwarf virus.
A.R. Rothamsted exp. Stat. 1960, 1961, pp. 118-19.

Spraying a carrot crop with Metasystox in mid-June and early July reduced motley dwarf virus infection by 21% and increased root yield by an average of 2·02 tons/acre, by controlling the vector (*Cavariella aegopodiae*). Neither plant density nor plant nutrition appeared to affect the percentage of infection, which was the main factor in yield reduction.

6416. Peachey, J. E., and Winslow, R. D.
Nematicides.
A.R. Rothamsted exp. Stat. 1960, 1961, pp. 137-8.

At the R.H.S. Gardens, Wisley, *Pratylenchus penetrans* was still very rare in carrot plots a year after they were treated with Vapam or methyl bromide. Plots treated with ethylene dibromide also had populations well below the original level, whereas populations of the untreated plots had trebled. Although other Tylenchida were less effectively controlled, their numbers showed similar trends, but populations remained below the original level only on the Vapam-treated plots. Saprozoic nematodes, after being first brought to low levels by Vapam, increased to high levels the following spring and declined to the same levels as in the untreated plots by autumn. Yields from the methyl bromide plots in the second year were higher than those from other plots, but the differences were less. All treated plots yielded better than the untreated, which yielded less than in the first year. In another experiment with carrots Vapam at full and half rates, Mylone and a very small dose of a methyl bromide-chloropicrin mixture all almost completely controlled soil nematodes, and DD decreased populations by 90%. The methyl bromide-chloropicrin plots yielded significantly better than all other plots and produced carrots judged to have the best quality. The yield effects in this experiment appeared to be related to the "soil amendment" following partial sterilization rather than to control of plant parasitic nematodes. [From authors' report.]

6417. Åvall, H.
Sort- och kulturförsök med rädisor. **(Varietal and cultural trials with radishes.)** [English and Esperanto summaries $\frac{1}{2}$ p. each.]
Medd. Trädgårdsförs., Alnarp, **130**, 1960, pp. 42, bibl. 10, illus.

Trials with forcing and outdoor varieties are described. Seed size was correlated with yield, and crops raised from seeds with a diameter greater than 2 mm. were 3 times as high as crops from seeds less than 1·5 mm. in diameter. Seed ripeness was also an important factor, and the highest yields of Saxa forced during the winter were obtained from seed harvested at the end of July. Seed should not be covered by more than 2 cm. of soil. In unfavourable growing conditions the roots tended to become conical, and the proportion of such roots increased as the growing conditions became less favourable. The temperature during forcing should be related to the prevailing day length; there was no difference in yield between the various soil-heating agents used. Plastic films are not recommended for use as glass substitutes in frames.

6418. Peterson, J. L., and Pound, G. S.
Studies on resistance in radish to *Fusarium oxysporum* f. *conglutinans*.
Phytopathology, 1960, **50**: 807-16, bibl. 6, illus.

See *H.A.*, 30: 5540.

Spinach.

(*See also* 6238, 6239, 6242.)

6419. Katayama, Y., and Shida, S.
Influences of day length and temperature difference on sex-ratio in spinach.
Bull. Fac. Agric. Univ. Miyazaki, 1960, **6**: 114-17, from *Biol. Abstr., Sect. D*, 1961, **36**, Abstr. 42,485.

Spinach seedlings were subjected to photoperiodic treatment in September (a high temperature month) and in December (a low temperature month). Long-day treatment produced more male, and short-day treatment more female, plants in both months. The extent of the change in the sex-ratio was greater in the high temperature month.

6420. Rees, W. J., and Sidrak, G. H.
Inter-relationship of aluminium and manganese toxicities towards plants.
Plant and Soil, 1961, **14**: 101-17, bibl. 11, illus.

Sand and water culture experiments were carried out with several plants, including spinach, in 3 series, viz: (1) with additional A1 (0 to 60 p.p.m.) as sulphate in one sub-series and as the EDTA complex in the other; (2) with additional Mn (5 to 100 p.p.m.) in the corresponding alternative forms; and (3) with 5 and 25 p.p.m. Mn as sulphate, combined at both levels with 10–50 p.p.m. Al using the EDTA complex. The work was carried out in connection with plant nutrition on fly ash (ash from power stations). Chlorosis and tip die-back were induced and yield was decreased in spinach by increasing levels of A1 as sulphate. Spinach yield was slightly reduced by both forms of Mn. Both the EDTA complexes were harmful to spinach, decreasing the Mg content, and both increased the absorption of P and Fe. The toxicity of A1 was related to its unfavourable effect on the K/Ca ratio, whereas Mn toxicity was due partly to this same effect, but mainly to a disturbance of the Fe/Mn ratio. [See also *H.A.*, 27: 2388.]—Univ. Birmingham.

Sweet and red peppers and eggplants.

(*See also* 5700, 6242, 6243, 6245, 6257, 6316, 6481, 7264.)

6421. Odland, M. L.
Inheritance of flower color in *Capsicum annuum* L.
Proc. Amer. Soc. hort. Sci., **76**: 475-81, bibl. 4.

Genetical data indicating that colour is conditioned by 3 genes.

6422. Cook, A. A.
Syndrome of potato virus Y in progenies from crosses between susceptible Large Bell Hot and two resistant pepper varieties.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 482-5, bibl. 5, illus.

Genetical aspects of resistance.

6423. Sowell, G., Jr.
Bacterial spot resistance of introduced peppers.
Plant Dis. Reptr, 1960, **44**: 587-90, bibl. 8.

Strains of *Capsicum frutescens* sufficiently resistant to *Xanthomonas vesicatoria* to be valuable in breeding for resistance are listed. [See also *H.A.*, 31: 2553.]

6424. Jagisita, N.
Vegetative hybridization of red peppers. [Russian.]
Agrobiologija, 1960, No. 6, pp. 886-93, bibl. 3, illus.

Changes were noted in the fruit shape when 2 varieties of red pepper were grafted on each other. In 2 generations of seedlings from the grafted plants many more abnormally shaped fruits were formed than on ungrafted control plants.

6425. Windham, S. L.
Combination of early and late peppers favored.
Miss. Fm Res., 1960, **23**(12): 1, 7.

Under adverse weather conditions in 1960 Yolo Wonder B and Oakview Wonder were the highest early yielders of 8 varieties tested. Yolo Wonder B also gave the highest total yield, followed by Keystone Resistant Giant. Oakwood Wonder produced the largest percentage of fancy fruits.

6426. Anon.
[Peppers.] Calcium is necessary.
Amer. Veg. Gr, 1961, **9**(6): 28.

In experiments at Clemson College, S.C., 22% of the fruits picked from plants grown in a medium low in Ca showed lesions of blossom-end rot.

6427. Taylor, J., and Dobson, J. W., Jr.
The relation of fertilization to development of bacterial spot on pepper.
Plant Dis. Reptr, 1960, **44**: 172-5, bibl. 5, illus.

The incidence of bacterial spot (*Xanthomonas vesicatoria*) on pepper decreased as the application rates of fertilizer (12: 12 : 12) increased to 5,000 lb./acre. [See also *H.A.*, 31: 2554.]—Ga Mountain Exp. Stat., Blairsville.

6428. Pound, G. S., and Singh, G. P.
The effect of air temperature on multiplication of tobacco mosaic virus in susceptible and resistant pepper.
Phytopathology, 1960, **50**: 803-7, bibl. 9, illus.

The responses to temperature depended markedly on the resistance of the capsicum variety tested.

6429. SHOREY, H. H.
Effect of various insecticide treatments on populations of the green peach aphid on peppers in southern California.
J. econ. Ent., 1961, **54**: 279-82, bibl. 4.

Most organic phosphate insecticides were relatively ineffective against *Myzus persicae* or caused a resurgence in aphid numbers after fair initial control. Thiodan as a dust or spray, Bayer 30911 (methyl-*O*-methyl *O*-2,4-dichlorophenyl phosphonothioate) as a dust, and dimethoate, Phosphamidon and General Chemical 4072 (diethyl-1(2,4-dichlorophenyl)-2-chlorovinyl phosphate) as sprays appeared to be highly effective against the aphid, reducing populations to low levels for periods of from 4 to 20 days. [From author's abstract.]—Univ. Calif., Riverside.

6430. ANANDASWAMY, B., MURTHY, H. B. N., AND IYENGAR, N. V. R.
Prepackaging studies on fresh produce: *Capsicum grossum* Sendt. and *Capsicum acuminatum* Fingh.
J. sci. industr. Res., India, Sect. A, 1959, **18A**: 274-8, bibl. 4.

Sweet peppers (*C. grossum*) were stored in bags, 10 × 14 in. in size, consisting of (1) 150-gauge polythene, (2) plain transparent cellulose and (3) moisture-proof, heat-sealable transparent cellulose (M.S.T.), both with and without aeration vents. Green chillies (*C. acuminatum*) were stored in similar but smaller bags, 7 × 9½ in. in size. The shelf life of sweet peppers was nearly doubled in comparison with unbagged controls by pre-packaging them in ventilated polythene bags and also in M.S.T. bags, when they were stored at either 100° F. and 90% R.H., 76–80° F. and 65–75% R.H. or 47–50° F. and 80–90% R.H. With green chillies stored at low temperatures the fruits in all 3 types of bag kept better than unbagged controls, but at higher temperatures pre-packaging showed no clear advantages except for one batch of chillies which were held in polythene bags at 76–80° F. and 65–75% R.H. Pre-packaging did not affect the ascorbic acid contents of either fruit. —Cent. Food technol. Res. Inst., Mysore.

6431. SIMON, J.
Ertrag und Vitamin C-Gehalt bei Paprika. **(Yield and vitamin C content of red peppers.)** [English summary ¾ p.]
Bodenkultur, 1960, **11**: 208-27, bibl. 20, illus.

Plants of the varieties Neusiedler Ideal and Tomatenfrüchtiger Paprika were thinned to leave 3 or 5 fruits or were left untreated. The individual weights of the 3 fruits were higher than those of the 5-fruit treatment, but the total yield of the 5 fruits was 50–55% higher than that of the 3-fruit treatment. In the 2 varieties the vitamin C contents increased from 217 and 185 mg.%, respectively, when the fruits were first ready for picking, to 321 and 259 mg. % at the stage of intermediate ripeness and then dropped to 302 and 251 mg. % at the stage of seed ripeness. The vitamin C of red fruits was much more resistant to oxidation than that of green fruits. Destruction of ascorbic acid on cooking was insignificant, and whole peppers could also be stored without loss of vitamin C. No decrease in content occurred during deep-freezing, but considerable losses occurred during thawing. —Inst. Pflanzenb. Pflanzenzücht., Hochsch. Bodenkult., Wien.

6432. WINSTEAD, N. N., AND KELMAN, A.
Resistance to bacterial wilt in eggplant in North Carolina.
Plant Dis. Reptr, 1960, **44**: 432-4, bibl. 19.

The Matale and Kopek varieties showed good resistance to *Pseudomonas solanacearum*. In contrast all Black Beauty and New York Spineless plants were killed. Florida Market, Florida High Bush and Fort Myers Market were intermediate in resistance. The undesirable shape and colour of Matale and Kopek fruits will probably limit their acceptance for commercial eggplant production in North Carolina, but their superior resistance may be of great importance in a breeding programme. [From authors' summary.]—N. C. St. Coll., Raleigh.

Tomatoes—general.

6433. ALVEY, N. G.
Methods likely to reduce the glasshouse area needed for experiments with the tomato.
Plant and Soil, 1961, **14**: 22-32, bibl. 14.

Reliable measurement of the fresh weight and possibly the stem height of month-old seedlings gave as good a prediction of early yield as the dry weight. More uniform results for the date of flowering were obtained by growing plants in pots than in glasshouse beds. The latest stage of development at which measurements can conveniently be taken, whilst the seedlings are still occupying a small area, is the flowering of the second inflorescence; measurements taken at this stage will give a more reliable prediction of early yield than measurements taken earlier. Where it is necessary to study early yield, the number of plants required to conduct an experiment of stated sensitivity is not likely to be much reduced by using small, rather than large, plots; this applies to plots containing up to 10 plants. It is likely that the percentage standard errors of experiments on early yields will be smaller when using an inbred variety of low variability than when using an F_1 hybrid. [From author's summary.] —John Innes Inst., Bayfordbury, Herts.

6434. LOVATT, B. A.
Commercial tomato production.
Scot. Agric., 1961, **41**: 37-9.

For glasshouse production in Scotland the author recommends (1) the establishment and further development of specialist tomato-plant nurseries; (2) that the cultivation of tomato house borders should be a separate operation from steaming, the latter being performed by the use of combs rather than Hoddeston pipes; and (3) a calculated and precise programme of cleaning the houses at the end of the season.

Tomatoes—breeding and varieties.

(*See also* 5705, 6471.)

6435. Yu, S.-A., and Yeager, A. F.
Ten heritable mutations found in the tomato following irradiation with X-rays and thermal neutrons.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 538-42. bibl. 5.

Descriptions of the mutations and suggestions on their possible mode of inheritance.

6436. Kemp, G. A.
Evaluation of the progeny of F_2 tomato selections by replicated field tests.
Diss. Abstr., 1961, **21**: 2845, being *L.C. Card No. Mic.* 61-571 of 79 pp.

Methods used in a breeding programme to combine fruit size and earliness.

6437. Wann, E. V., and McFerran, J.
Studies of the inheritance of red color in fruits of *Lycopersicon pimpinellifolium* Mill.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 524-9, bibl. 10.

Genetics of crosses between the tomato variety Indark and a *L. pimpinellifolium* selection.

6438. Prashar, D. P., and Lambeth, V. N.
Inheritance of radial fruit cracking in tomatoes.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 530-7, bibl. 3, illus.

Studies on the progeny of varieties that are resistant and susceptible to cracking.

6439. Young, H. W.
Inherited fruit cracking resistance in the tomato.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 148-53, bibl. 4.

The three distinct types of cracking observed in this study were radial, concentric and bursting. The results appear to support the contention that resistance to radial cracking is controlled by two major pairs of recessive independent genes [see *H.A.*, 31: 790]. The data on concentric cracking, although indicating a genetic control, do not fit a precise genetic hypothesis. The data on bursting of the side walls confirm that the tendency to bursting is inherited. [From author's summary.] —N. Fla Exp. Stat., Quincy.

6440. Alpat'ev, A. V., and Jur'eva, N. A.
Variability and inheritance of dry matter content in tomato fruits in relation to the conditions of growth. [Russian.]
Agrobiologija, 1960, No. 6, pp. 832-8.

The maximum dry matter content and the maximum variation in this content was found in families of seedlings raised on highly fertile plots and under favourable growing conditions. Therefore, selection of seedlings for high dry matter content should, if possible, be carried out under these conditions. In the Moscow region the dry matter content of the fruits from a range of varieties varied by 3–4%. The individuals of the first generation of an interspecies cross had high dry matter contents. In subsequent generations the dry matter content fell.

6441. Böttcher, F., and Samsonova, I.
Förderung des Pollenschlauchwachstums bei Kreuzungsinkompatibilität durch Bestäubung mit Pollengemischen. (**Stimulating pollen tube growth in cross-incompatibility by pollination with pollen mixtures.**)
Naturwissenschaften, 1961, **48**: 461, bibl. 8.

By using labelled pollen of *Lycopersicon esculentum* it was shown that the incompatibility between tomato and *Solanum nigrum* could be broken by mixing *Solanum* pollen with that of the tomato at pollination.—Inst. Agrobiol., Ernst-Moritz-Arndt-Univ., Greifswald.

6442. Foskett, R. L.
Polyembryonic tomatoes, a possible research tool.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 548-54, bibl. 6, illus.

Notably in the variety Beefsteak.

6443. Sanduljak, E., and Sandulesku, P.
An experiment on grafting Humbert and Albino [tomatoes]. [Russian.]
Agrobiologija, 1960, No. 6, pp. 896-8, illus.

The vegetative hybrid produced in Romania by grafting these red and yellow fruited varieties together resulted in the production of some orange fruit and trusses with some fruit typical of each variety in shape. Seeds of the original "hybrid" produced plants with yellow, orange, pink and red fruit, and some plants with fruit shaped like both parents.

6444. Scott, F. H., and Johnson, L. W.
1960 variety trials—tomato—sweet potato.
Res. Rep. Va agric. Exp. Stat. **47**, 1961, pp. 40.

The best tomato varieties were: for the fresh market Campbell 146 and Delaware 14–2, and for canning Homestead 24.

Tomatoes—seedling production and planting.

(*See also* 5629, 6450, 6668, 7288.)

6445. Lamm, R.
Försök med jiffy-pots till plantuppdragning av drivtomat vid Alnarp 1957-59. (**Studies with Jiffy pots for raising glasshouse tomatoes at Alnarp 1957-59.**) [English and Esperanto summaries ½ p. each.]
Medd. Trädgårdsförs., Alnarp **134**, 1960, pp. 8, bibl. 8, illus.

With direct sowing into Jiffy pots, the average yields in the first 4 weeks were 13% higher than those from plants raised in seed boxes and pricked out. Total yields were 5% higher. Differences in fruit quality were small.

6446. Dyck, R. L., and McFerran, J.
Fresh market tomato yield as affected by transplant production and starter solution.
Arkans. Fm Res., 1961, **10**(1): 3, illus.

Direct seeding in peat pots 4–5 weeks before setting out in the field gave the highest early and total yields, but sowing in pots 6 weeks before field planting gave the earliest measurable yield. The use of a soluble fertilizer feed at the time of transplanting increased quality and total yields.

6447. (Minges, P.)
Tomatoes. Set younger plants.
Amer. Veg. Gr, 1961, **9**(3): 46.

Tomatoes transplanted at 3 weeks from sowing yielded 35·4 tons/acre compared with 34·9 tons/acre when transplanted at 5 weeks, and 27·8 tons/acre when transplanted at 9 weeks. In spacing trials a population of 4,500–5,000 plants per acre gave a higher net return of canning tomatoes than 3,000 plants per acre.—Cornell Univ., Ithaca.

Tomatoes—irrigation and nutrition.

(*See also* 5641, 5654, 5657, 5662, 6239, 6241, 6245, 6251, 6446, 6464, 6468, 6470, 6471, 7264, 7266.)

6448. Takahashi, K.
Studies on the composts for raising vegetable seedlings in hot beds. II. The effect of soil moisture on the growth of tomato seedlings. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1960, **29**: 313-22, bibl. 13, illus.

Seedlings of the Kurihara variety were transplanted at the 2–3-leaf stage into 30 × 30 × 10 cm. metal containers in the greenhouse and watered each day to maintain the soil at full moisture capacity, or at 75, 50, 25 or 0% of full capacity. Growth of the seedlings was closely correlated with the amount of water added. No effects on growth were observed when the temperature of the irrigation water was varied. [For part I, see *H.A.*, 31: 796.]

6449. Belik, V. F.
The development of tomatoes and the cell sap concentration of the leaves at different soil moisture levels. [Russian.]
Bot. Žurnal, 1960, **45**: 1063-6, bibl. 7, illus.

In container-grown tomatoes with the soil at 40–50, 60–70 and 80–90% of full moisture capacity, the cell sap concentration of the leaves below the first flowers truss at 10–11 a.m. was 10–11, 8–9 and 7–7·5%, respectively [see also *H.A.*, 31: 809]. Transpiration was most intensive and growth and development most vigorous in tomatoes grown at 60–70% of full moisture capacity, and these plants also produced the highest yields of the heaviest fruits.

6450. Lingle, J. C.
The effect of source of phosphorus on the growth and phosphorus uptake of tomato seedlings.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 495-502, bibl. 12.

The effects of several nitrogen-phosphate fertilizers on the seedling growth, P concentration in the tissue and the yield of direct-field-seeded tomatoes were compared. Little difference was found between the highly water-soluble forms except for a liquid formulation on Yolo soil. This material provided less P in the tissue than dry formulations of similar nature. No such difference was found in a Wyman soil. A phospho-nitric phosphate fertilizer produced less seedling growth and a lower P concentration in the tissue than the other dry materials. There were no differences between materials in yield responses. Fertilization significantly increased early yields but not total yields. [Author's summary. For related work see *H.A.*, 30: 776.]—Univ. Calif., Davis.

6451. Locascio, S. J., Warren, G. F., and Wilcox, G. E.
The effect of phosphorus placement on uptake of phosphorus and growth of direct-seeded tomatoes.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 503-14, bibl. 18, illus.

See *H.A.*, 30: 3917.

6452. Jones, L. H.
Some effects of potassium deficiency on the metabolism of the tomato plant.
Canad. J. Bot., 1961, **39**: 593-606, bibl. 35.

The organic and keto acid levels in the leaves of tomato plants grown with various levels of K were examined. As the K level was reduced, the levels of malic, oxalic and sometimes pyruvic acids decreased, whereas citric, α-ketoglutaric and glyoxylic acids accumulated. Total organic acids remained almost constant at all K levels, and such changes as occurred in the cation levels were balanced by phosphate. These relationships held for plants grown under widely different environmental conditions and were not affected by the age of the plants. [From author's abstract.]—Canada Dep. Agric., Plant Res. Inst., Ottawa.

Tomatoes—environment, growth and physiology.

(*See also* 5618, 5650, 5700, 5703, 5775, 5777, 6449, 6452, 6479, 6480, 6490, 6494, 6669, 7269.)

6453. Čeremnyh, L. N., and Naumova, A. N.
Soil temperature conditions and tomato yields. [Russian, with English summary ¼ p.]
Izv. Akad. Nauk. SSSR, Ser. biol., 1961, No. 3, pp. 452-7, bibl. 18.

In the production of tomatoes and other heat-loving vegetables the utilization of waste industrial heat is recommended for warming uncovered soil throughout the growing season. In experiments with tomatoes grown in soil heated by electrodes cropping was advanced, yields were doubled, and the dry matter, acid, vitamin C and sugar contents increased compared with the controls grown in unheated soil. The optimum soil temperature was in the range 25–30° C. The microflora of the heated soil increased both in quantity and activity.

6454. Henrard, G.
Essai sur l'application de la lumière artificielle à la culture forcée de la tomate. **(A trial on the application of artificial light to the forced culture of tomatoes.)**
Bull. hort., Liège, 1961, **16**: 123-7, bibl. 10.

In 4 trials with 2 varieties at Gembloux 6 different types of lamp were compared at 300 watts per sq. m., the artificial light being given between 8 a.m. and 4 p.m. for about 40 days. Philips Tube TL 34 gave the best results with regard to both earliness and yield, but Philips HPL, which was second best, was easier to instal and the shade cast by its reflector was less. The sale of the fruit from 150 plants grown with these two lamps produced respectively Fr. 10,960 and 10,612, compared with Fr. 6,385 from the control.

6455. Cooper, A. J.
Observations on the seasonal trends in the growth of the leaves and fruit of glasshouse tomato plants, considered in relation to light duration and plant age.
J. hort. Sci., 1961, **36**: 55-69, bibl. 6.

Potentate tomato plants sown in the winter (October-February) had a longer period of increasing leaf area and attained a larger total maximal leaf area than plants sown in the summer months. In all except one sowing the weekly rate of leaf area production increased to a maximum and then declined to a relatively low level which was maintained. The start of the decline from the maximum leaf area production coincided with the swelling of the first ovaries. These began to swell at 1 of 2 ratios of immature/mature leaf area; either at a ratio of 19:1 when the duration of light exceeded that of darkness, or at 4:1 when light did not exceed darkness. The age at which these ratios were reached was negatively correlated with day length. Ovary development was arrested during November-January, irrespective of plant age or the volume of fruit on the plant. The weekly rate of fruit volume production increased to a maximum, which was reached at the same time as a minimal leaf area/fruit volume ratio was attained; this ratio was maintained up to the period of arrested ovary development, when, in consequence of a lesser inhibition of leaf growth, the ratio rose rapidly. Fruit yields were observed to be greater, the closer to the shortest day of the year that germination occurred. The time of production and position of the largest leaf was influenced by day length and sowing date. Fewer leaves were produced before flowering in the winter than in the summer, but there were more leaves between the first and second inflorescences in the winter than in the summer. The total leaf number to the second inflorescence was constant throughout the year at 11–12 leaves. [For earlier work see *H.A.*, 29: 3689 and 3690.]—Glasshouse Crops Res. Inst., Littlehampton.

6456. Cooper, A. J.
Observations on flowering in glasshouse tomato plants considered in relation to light duration and plant age.
J. hort. Sci., 1961, **36**: 102-15, bibl. 6.

It was found that the age at which flower buds first appeared was correlated with day length, the greater the day length the younger the plant at flower bud appearance. At day lengths of less than 12 hours a greater effect was observed for a given change in light duration than at day lengths of more than 12 hours. There was no relation between the age of the plant at flower bud appearance and the total hours of light received. There was, however, a relation between leaf area at flower bud appearance and day length. Flower buds appeared with minimal leaf area at a day length approximating to 12 hours, any increase or decrease in light duration being associated with an increase in leaf area. At a day length of approximately 12 hours the flower buds appeared after the minimal total light had been received. An inverse relation was observed between plant age at the appearance of the inflorescence possessing the largest bud number and the mean day length of the growing period. This relation held up to a critical day length, above which it no longer held. Failure of the lower inflorescences to complete their development coincided with the existence of a light-dark condition in which a day length shorter than the night length was coupled with a progressive decrease in the day length. The age of the plant at which flowering began was greater in the winter than in the summer. When the sowing date was 27 October and there was unrestricted root run and heavy watering, flowering was completely arrested in the very short days of midwinter. [From author's summary.]—Glasshouse Crops Res. Inst., Littlehampton.

6457. SPENDER, B.
Blütenendständigkeit als Erscheinung nach der Überwinterung von Tomatenjungpflanzen. (**Terminal flowers as a phenomenon after overwintering of young tomato plants.**) [Russian and English summaries ½ p. each.]
Arch. Gartenb., 1961, **9**: 134-8, bibl. 8, illus.

In some overwintering varieties (sown at the beginning of September) plants produced an apical inflorescence. Such plants generally also produced a vigorous side shoot which could be grown on as the main stem. This inflorescence production may result from poor winter light intensity.—Inst. Gartenb., Grossbeeren.

6458. LEOPOLD, A. C., AND LAM, S. L.
A leaf factor influencing tomato earliness.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 543-7, bibl. 8.

Removing young expanding leaves from the 3rd node upwards, and especially from the 4th, 5th and 6th nodes, advanced the date of flowering of the first truss and increased the number of flowers in that truss. The advance in the date of flowering was, however, only pronounced (7–10 days) in late varieties. The removal of mature leaves below the 4th, 5th or 6th nodes retarded flowering of the first truss. These results are taken to confirm that the young expanding leaves possess an inhibiting effect on the earliness of flowering and the number of flowers formed in the first flower truss. It is suggested that leaf growth rate might be one of the factors considered in the breeding of tomatoes for earliness.—Purdue Univ., Lafayette, Ind.

6459. PÉREZ LÓPEZ, A.
Relation of earliness to some plant characters in the tomato. [Spanish summary ¾ p.]
J. Agric. Univ. P.R., 1960, **44**: 236-50, bibl. 2.

In the 4 varieties studied earliness appeared to be associated with a high rate of leaf production, a smaller number of leaves on the main stem up to the 1st inflorescence but larger numbers between the 1st and 2nd and the 2nd and 3rd inflorescences, concentration of the first 4 flowering branches within a short distance on the stem, and thinner stems with smaller leaves.

6460. LEH, H.-O.
Veränderung des Blatthabitus bei Tomaten durch Gibberellin. (**Changes in the leaf form of tomato induced by gibberellin.**)
Naturwissenschaften, 1961, **48**: 460, illus.

When the roots of 6-leaved tomato plants were dipped in 20 p.p.m. GA for 24 hours the leaves produced subsequently had fewer lobes, more pointed tips and were smaller than those produced on plants dipped in distilled water.—Inst. PflErnähr., tech. Univ. Berlin.

6461. HAESLOOP, J. G.
The effect of gibberellic acid on cell division and cell elongation in stems of *Lycopersicum esculentum*.
Diss. Abstr., 1961, **21**: 1723, being *L.C. Card No. Mic.* 60-4840 of 114 pp.

After GA treatment the stem pith had a smaller final diameter than that of untreated plants, and the final lengths of the first internodes of treated plants were much greater than those of control plants. The cell number across the pith was not affected by GA treatment, but the final number of cells in the longitudinal axis was greatly increased. It was concluded that GA increased the rate of cell elongation. There were indications of an antagonistic interaction between MH and GA. Growth observations of GA-treated plants showed increased stem height, slight leaf chlorosis, the formation of entire-margined leaves, and an increased rate of leaf formation; flowering characters were not affected. The stem dry weight increased at the expense of the leaf dry weight.—Univ. N.C.

6462. KOVÁCS, J., AND UDVARDY, J.
Különböző kezelések hatása a növényházi paradicsom terméskötésére. (**The effect of different treatments on fruit set in glasshouse tomatoes.**) [English and Russian summaries ½ p. each.]
Növénytermelés, 1961, **10**: 145-50, bibl. 30.

In a hybrid tomato the effects were compared of exposure of the seedlings in the cotyledon stage to 10°–13° C. for 2 weeks, daily vibration of the inflorescences by hand, and spraying the flowers twice a week with 10 p.p.m. 2,4-D (sodium salt). All 3 treatments increased both early and total yields and also the monetary value of the crop. The average weight of the fruits was not substantially affected by any of the treatments; the dry matter content was slightly increased by 2,4-D and reduced by exposure to cold and vibration.

6463. (BROOKS, W. M.)
Modified pruning.
Amer. Veg. Gr, 1961, **9**(3): 48.

Fruit cracking of tomatoes can be reduced by as much as 60% by means of pruning. Sideshoots are allowed to grow from below the first flower cluster, and from above the third or fourth cluster, but between these points sideshoots are removed. —Ohio agric. Exp. Stat., Wooster.

6464. Niiuchi, K., Honda, F., and Ota, S. **Studies on cracking in tomato fruits. I. Mechanism of fruit cracking.** [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1960, **29**: 287-93, bibl. 8.

Although tomato fruits each absorbed 0·6–2·4 g. of water when immersed, cracking did not occur unless the pink stage had been reached. Cracking was reduced by shading, removal of leaves, covering the fruits with black paper bags, and by maintaining a low soil moisture content. Removal of ¾ of the leaves increased concentric cracking but decreased radial cracking, and a change from low to high soil moisture induced more cracks than a change from medium to high soil moisture content. Elasticity of the skin, the sugar content of fruit and root pressure were factors influencing cracking.

6465. Efejkin, A. K. **Inversion of polarity in plants.** [Russian, with English summary 8 lines.]
Bot. Žurnal, 1961, **46**: 174-82, bibl. 32, illus.

The polarity of tomato plants was inverted by layering the stem apices, and when these had rooted, severing the stems at the original root neck. From both the inverted stems and cuttings taken from them normal fruit-bearing plants developed.

6466. Rovira, A. D., and Bowen, G. D. **Plant root development as influenced by soil micro-organisms.**
From abstr. in *Aust. J. Sci.*, 1960, **22**: 482.

The elongation of primary and secondary roots of several plant species, including tomato, growing in agar and sand was markedly reduced following inoculation with soil suspension. A slight reduction in density and length of root hairs was noted on tomato, and a marked reduction on clover.—C.S.I.R.O., Adelaide.

6467. Rovira, A. D. **Plant root excretions in relation to the rhizosphere effect. IV. Influence of plant species, age of plant, light, temperature, and calcium nutrition on exudation.**
Rovira, A. D., and Harris, J. R. **Idem. V. The exudation of B-group vitamins.**
Plant and Soil, 1959, **11**: 53-64, bibl. 14, illus., and 1961, **14**: 199-214, bibl. 19.

Part IV compares the exudation of amino acids from the roots of seedling tomato and other plants grown for 4 weeks in nutrient solutions. Exudation was greater during the first than during the second fortnight. In the tomato exudate decreasing the light reduced the amounts of aspartic acid, glutamic acid, phenylalanine and leucine, and increased serine and asparagine. The total exudation and the glutamic acid fraction were increased by raising the temperature progressively from a diurnal range of 16–30° to one of 32–41° C. Aeration and Ca level had little effect, but the presence of micro-organisms on and near the tomato roots reduced the free amino acids during the second fortnight. In part V quantitative results are given for B-vitamin exudation from the roots of tomato seedlings and those of various leguminous plants, including peas. Biotin, niacin and pantothenate were exuded from both tomatoes and peas, and possible traces of thiamine and riboflavin from peas. The exudation was increased by seed sterilization, low temperature and an adequate supply of nutrients.—C.S.I.R.O., Adelaide. [For parts I-III see *H.A.*, 27: 2436.]

6468. Ansiaux, J. R. **Migrations of mineral substances and development of ionic composition in growing tomato plants.** [French?]
Ann. Physiol. vég., Brussels, 1960, **5**: 19-260, from abstr. in *J. Sci. Food Agric.*, 1961, **12**: i-267.

Comparison of sterilized [non-fruiting?] and fruiting plants revealed a competition between the fruits and vegetative parts, which resulted in the gradual accumulation of NO_3, PO_4 and K in the fruits. In ripe fruits these 3 ions constituted 90% of the mineral matter. A difference was observed between the mineral composition patterns of the stems and leaves. The dry-matter and fixed-N content of the leaves decreased with age, whereas the leaf Mg increased. The above effects were not modified by alterations in the climatic or nutritional conditions.

6469. Purcell, A. E., and Thompson, G. A., Jr. **Glucose as a carbon source for carotene synthesis in tomatoes.**
Arch. Biochem. Biophys., 1961, **93**: 231-7, bibl. 14.

Mevalonic acid was the most efficient precursor of carotenoids in detached fruits, and acetate was also incorporated *via* mevalonic acid. Glucose and carbon dioxide were more efficient precursors than acetate, but less efficient than mevalonic acid. Their probable pathway is discussed.—U.S. Fruit Veg. Prod. Lab., Weslaco, Texas, and Calif. Inst. Tech., Pasadena.

Tomatoes—disorders and diseases.

(*See also* 6251, 6316, 7270, 7287.)

6470. Geraldson, C. M. **Nutritional factors affecting the incidence and severity of blotchy ripening of tomatoes.**
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 111-14, bibl. 18.

The incidence and severity of blotchy ripening of tomato fruits grown in greenhouse nutrient cultures was associated with low nutrient concentrations and low nitrate/chloride ratios. Symptoms were similar to the tomato fruit disorders known as greywall, cloud, internal browning and vascular browning. [Author's summary.]—Gulf Coast Exp. Stat., Bradenton.

6471. Young, P. A.
Dwarfing of summer tomatoes by crease stem.
Plant Dis. Reptr, 1960, **44**: 170-1, bibl. 3, illus.

Crease stem causes dwarfing, short internodes, rigidly upright stems and a very compact bunchy appearance of the plants. It is associated with conditions of abundant N in a warm, wet soil. Tomato varieties and selections ranged from immune to very susceptible to crease stem. [From author's summary. See also *H.A.*, 31: 2594.]—Texas agric. Exp. Stat., Jacksonville.

6472. Rasa, E. A., and Esau, K.
Anatomic effects of curly top and aster yellows viruses on tomato.
Hilgardia, 1961, **30**: 469-515, bibl. 33, illus.

Both viruses cause proliferation and subsequent degeneration of the phloem in the shoot and the root.

6473. Ercolani, G. L., Casarini, B., and Silvestri, G.
Appunti sulle batteriosi del pomodoro nella Pianura Padana. **(Notes on tomato bacterial diseases on the Plain of Padua.)**
Inf. fitopat., 1961, **11**: 105-18, illus.

Symptoms and control of *Xanthomonas vesicatoria*, *Corynebacterium michiganense*, *Pseudomonas tomato* and *P. solanacearum*.

6474. Cox, R. S.
Studies on the control of southern bacterial wilt on trellis-grown tomatoes in south Florida.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 120-3, bibl. 2, illus.

Primary infection loci of *Pseudomonas solanacearum* have been associated with the use of spoil from drainage canals for filling up low areas of fields. Soil treatment, 3 weeks before planting, with chloropicrin at 160 or 320 lb./acre, Mylone 85W at 250 lb. or ammonium thiocyanate at 250 lb. has given good control. Urea at 1,000 lb. and ammonium thiocyanate at 125 lb. were moderately effective.—Dixon Farms Inc., Boynton Beach.

6475. Strong, M. C.
Control of bacterial spot and other fruit and foliage diseases of tomatoes.
Quart. Bull. Mich. agric. Exp. Stat., 1961, **43**: 690-4, bibl. 2, illus.

Tests over 2 years showed that combinations of various copper fungicides with organic fungicides gave the best control of early blight, septoria blight, bacterial spot and anthracnose. Satisfactory and promising control materials are listed.

6476. Roll-Hansen, J.
Some striking observations on the occurrence of fungi in steamed glasshouse soil.
Plant and Soil, 1961, **14**: 197-8, bibl. 2, illus.

In a tomato house *Plicaria fulva* and certain other fungi developing on steamed soil, although not parasitic, may seriously restrict the growth of young plants, and may necessitate spraying with captan or some other suitable fungicide.

6477. Butler, E. E.
Transmission of *Geotrichum* rot of tomato fruit by *Drosophila melanogaster*.
Phytopathology, 1961, **51**: 250-5, bibl. 15, illus.

6478. Timonin, M. I.
The interaction of plant, pathogen, and *Scaptocoris talpa* Champ.
Canad. J. Bot., 1961, **39**: 695-703, bibl. 8, illus.

An investigation was made of the effects of the odoriferous volatile matter produced by the heteropterous insect, *Scaptocoris talpa*, on the activity of *Fusarium oxysporum* f. *cubense*, *F. oxysporum* f. *lycopersici* and *Meloidogyne incognita* in soil, and of its phytotoxicity to tomato seedlings. Results indicated that 50–75 insects per pot protected Bonny Best tomato plants and Gros Michel banana plants from attack by their respective fungal pathogens, and that 1 insect per 2 g. of soil protected tomato seedlings from attack by the nematode. Using a specially constructed apparatus it was found that a 6-day weak flow of a mixture of air and the volatile matter produced by 350–400 insects was not phytotoxic to 6 tomato seedlings; nor was the volatile matter produced by 800 insects toxic to 1 seedling. Under similar conditions the volatile matter produced by 350–400 insects reduced the density of the *F. oyxsporum* f. *cubense* population in soil samples containing 25 and 15% (w/w) of moisture by 61·20 and 45·78%, respectively. It was also demonstrated that during 16 hours' incubation 1 insect per 2 g. of nematode-infested soil produced a nematicidal concentration of volatile matter. The possibility of a selective toxicity of the volatile odoriferous matter to various bacteria is also discussed. [From author's abstract.] V.C. Dunlap Labs, La Lima, Honduras.

6479. Deese, D. C.
The role of pectic enzymes in susceptibility and resistance of plants to *Fusarium* and *Verticillum* wilt diseases.
Diss. Abstr., 1961, **21**: 2873-4, being *L.C. Card No. Mic.* 61-633 of 153 pp.

Susceptibility to *Fusarium* wilt of tomato appeared to be correlated with an increase in the pectic polymerase content, and suppression of this enzyme suggested a basis for genetic resistance. *Verticillium albo-atrum* produced more pectic polygalacturonase on susceptible than on resistant tomato stems, and in a highly resistant variety no fungal polygalacturonase or reduction in viscosity of the pectate was detected but a high oxidizing power was shown. Growth of, and enzyme formation by, *Fusarium oxysporum* f. *cubense* on fruit stalk and pseudostem tissues from susceptible and resistant banana plants were related to varietal resistance. On susceptible pseudostems 2–3 times more depolymerase and 2–4 times more cellulase were formed than on pseudostems of resistant varieties. Resistant plants showed high oxidase activity. On susceptible banana plants the fungus produced a substance, probably fusaric acid, which inhibited growth of *Bacillus subtilis*.

6480. Wood, R. K. S.
Verticillium wilt of tomatoes—the role of pectic and cellulolytic enzymes.
Ann. appl. Biol., 1961, **49**: 120-39, bibl. 14.

Experimental evidence is presented suggesting that the enzymes are produced in the xylem of infected plants and are responsible for at least some of the symptoms found in diseased plants.—Conn. agric. Exp. Stat., New Haven.

Tomatoes—pests.

6481. Kelsheimer, E. G., and Wolfenbarger, D. O.
Control of insects and other pests of tomatoes, peppers and eggplants.
Circ. Fla agric. Exp. Stats **S-116**, 1959, pp. 36, illus.

6482. Martin, P.
La tomate de serre. IV. (**Glasshouse tomatoes. IV.**)
Rev. d'Oka, 1960, **34**: 130-7.

Notes on insect and other pests (including control measures), yields and marketing with reference to Quebec. [For earlier parts see *H.A.*, 31: 786 and 821.]

6483. Peachey, J. E., and Hesling, J. J.
Nematicides.
A.R. Rothamsted exp. Stat. 1960, 1961, p. 137.

Tomato plants dipped in a solution of SD4965 and later planted in root-knot infested soil did not remain free from nematodes. In pot tests Mylone, Nemagon and SD4014 considerably decreased root-knot infestation of tomatoes. Six chemical dips for the control of chrysanthemum eelworm in chrysanthemum stools were compared with the standard hot-water treatment. A parathion dip and hot-water treatment gave the best control. An iodine dip was also effective but was too phytotoxic. [From authors' report.]

6484. Lownsbery, B. F., and Viglierchio, D. R.
Importance of response of _Meloidogyne hapla_ to an agent from germinating tomato seeds.
Phytopathology, 1961, **51**: 219-21, bibl. 13.

The accumulation of *Meloidogyne hapla* around germinating tomato seeds is a composite effect of random nematode movement, nematode movement directed towards an agent from the germinating seed, and nematode detention at the root surface. The agent from the germinating seed increases the intensity of nematode attack, but does not rigorously govern host selection. [Authors' summary.]—Univ. Calif., Davis.

6485. Peacock, F. C.
A note on the attractiveness of roots to plant parasitic nematodes.
Nematologica, 1961, **6**: 85-6, bibl. 9.

Activated charcoal and ion exchange resins were added to rooting media for tomato seedlings. Only charcoal prevented root invasion by nematodes (*Meloidogyne incognita*), which suggests that CO_2 is not the attractant factor.—I.C.I. Ltd., Jealott's Hill Res. Stat., Bracknell.

6486. Miskimen, G. W.
Comparison of Sevin with DDT and rotenone on tomatoes under tropical conditions.
J. econ. Ent., 1960, **53**: 1128-9, bibl. 4.

In 1959, under the comparatively dry and warm conditions of the Virgin Islands, Louisiana All Season tomatoes given 20 weekly applications of Sevin produced 183·2% more fruit than DDT-treated plants and 457·1% more than rotenone-treated plants. Treatment with rotenone did not result in any increase in yield compared with the controls. Sevin gave very good control of the principal insect pests attacking tomatoes and also appeared to improve fruit set.—U.S.D.A., St. Croix, Virgin Is.

6487. Davis, A. C.
Drosophila control in tomato fields.
J. econ. Ent., 1960, **53**: 1107-10, bibl. 9.

A wettable powder, an emulsifiable concentrate and a granular formulation of diazinon, all at ½ lb. per acre, were equally effective in reducing drosophila, mainly *D. melanogaster*, activity in tomato fields. Malathion and Phosdrin had short residual action, but in limited trials Ronnel and Dibrom compared favourably with diazinon.—N.Y. St. agric. Exp. Stat., Geneva.

6488. Johnson, L. W., and Hofmaster, R. N.
The drosophila and processing tomatoes.
Circ. Va polytech. Inst. **873**, 1961, pp. 8, illus.

Control measures available to the grower include crop sanitation, careful handling of the fruit and the application of pyrethrum dust to the fruit immediately after harvesting.

Tomatoes—fruit harvesting, quality, composition and storage.

(*See also* 6464, 6468.)

6489. BRENDLER, R. A.
[Tomato trolleys.] They fight for them!
Amer. Veg. Gr, 1961, **9**(6): 28, illus.

Tomato pickers' output was increased by 20% when trolleys were used for stacking full boxes. Moving the trolleys between fields was simplified if the handles were removable to allow stacking on a truck.

6490. GARDNER, R.
Quality in tomatoes.
Agriculture, Lond., 1961, **68**: 125-9.

Investigations showed that small fruits tended to have the highest levels of sugars and acids and were the most palatable. Abundant light resulted in higher sugar levels, especially when combined with warmth, i.e. 63–65° F. at night and 67–75° F. during the day. A high level of soil moisture, especially in shade, depressed the percentage of sugars and dry matter. Under conditions which favoured fruit quality, fruit size was reduced. The relationship between fruit quality and market grading, and the improvement of quality by the correct choice of variety and cultural practices are discussed.—Lee Valley exp. Hort. Stat., Hoddesdon.

6491. GARRETT, A. W., AND OTHERS.
Effect of color on marketing of red tomatoes.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 55-9, bibl. 4.

Separate marketing studies were conducted with greenhouse and field grown tomatoes. Both studies were conducted to determine the effect of colour upon the sales of fresh tomatoes. Colour was measured objectively by use of the Hunter Color and Color Difference Meter. Data indicate that a highly significant variation in sales of fresh tomatoes exists due to the colour range available. A greater preference was shown for the reddest lot available, with the exception of one instance where very red tomatoes were offered for sale. It was also shown that some fruit were sold from all colour lots present regardless of the actual colour. This might be attributed to the purchase of tomatoes for other than immediate use. [Authors' summary.]—Purdue Univ., Lafayette, Ind.

6492. YAMAGUCHI, M., AND OTHERS.
Effect of ripeness and harvest dates on the quality and composition of fresh canning tomatoes.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 560-7, bibl. 19.

The quality and composition of Pearson tomatoes in California as affected by harvest maturity was studied for two years, 1957, when temperatures were near normal, and 1958, when temperatures were above normal. The tomatoes were harvested 3 times, as early-, middle-, and late-season fruit. Each harvest was composed of 4 maturities based on colour, texture, and appearance—pink, firm-ripe, canning-ripe and soft-ripe. The rate of ripening and yield of each pick varied markedly with temperature conditions. The Agtron E [colorimeter] instrument readings showed similar trends to those obtained from visual grading of maturity by colour. The pH of the tomatoes varied from 3·9 to 4·6, with the majority in the range of 4·2 to 4·5. As maturation proceeded, pH increased. The carotene content varied from 0·30 to 0·77 mg. per 100 g. No significant change in the beta-carotene content with ripeness was observed. Lycopene formation was most rapid during the pink up to the canning-ripe stages. Total solids and reducing sugars increased, and total acids decreased, with ripeness. No consistent trend was found in the ascorbic acid content with increasing maturity. Solids, acids and carotene contents were all higher in 1958 than in the cooler 1957 season. [Authors' summary.]—Univ. Calif., Davis.

6493. FREEMAN, J. A., AND WOODBRIDGE, C. G.
Effect of maturation, ripening and truss position on the free amino acid content in tomato fruits.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 515-23, bibl. 10, illus.

The predominant amino acids in Washington State Forcing tomato fruit as determined by paper chromatography were alanine, arginine, asparagine, aspartic acid, β-alanine, γ-aminobutyric acid, glutamic acid, leucine (and/or isoleucine), serine, threonine and valine. In addition, most of the samples tested contained traces of glycine, lysine and/or histidine and tyrosine (with possibly phenylalanine). Glutamic and aspartic acids increased with ripening, reaching a high point when the fruit on the vine was red ripe. Fruit that matured in a ripening room contained more total amino acids than did fruit ripened on the vine. [From authors' summary. See also *H.A.*, 31: 2646.]—Wash. St. Univ., Pullman.

6494. THOMPSON, B. D., GULL, D. D., AND HALSEY, L. H.
The effects of growing areas and seasons and pre-ripening temperatures on the quality of tomatoes.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 160-6, bibl. 7.

Mature-green tomatoes of the Homestead variety from 3 producing areas and 3 ripening periods were stored at 40°, 55° and 70° F. for 6 days before ripening at 70° F. The temperature effects were the most marked. Approximately 12% of all tomatoes exposed to the 40° F. pre-ripening temperature exhibited greywall, but at 55° and 70° F. greywall was insignificant. Somewhat softer fruit also resulted from exposure to the 40° pre-ripening temperature, and stippling, uneven colour development, ghostly appearance, dark seeds and decay were accentuated. [From authors' summary.]—Fla agric. Exp. Stat., Gainesville.

6495. El-Shiati, M. A., Atwa, A. A., and Esawy, M. T.
Studies on the storage of "Pearl Harbour" tomatoes.
Agric. Res. Rev., Cairo, 1959, **37**: 532-67, bibl. 23, illus.

Storage at 45° F. was more satisfactory than at 65° F. for both green mature and turning tomatoes; green mature fruits can be stored for 6 weeks at 45° and 5 weeks at 65° F. Compared with tissue paper, polythene sheet lining for the boxes increased wastage but reduced loss of firmness and weight. The polythene lining also led to a higher specific gravity of the fruit and lower optical density, lower soluble solids content and less acidity in the juice. Colour formation however, was superior in the tissue-lined boxes, and colour developed more rapidly in the turning than in the green mature fruits. Disinfection by dipping the fruits in calcium hypochlorite or borax-boric acid solutions appeared to have little effect on decay, quality or composition.

6496. Eaves, C. A., and Lockhart, C. L.
Storage of tomatoes in artificial atmospheres using the calcium hydroxide absorption method.
J. hort. Sci., 1961, **36**: 85-92, bibl. 7.

Fruit was stored in cabinets holding 3 standard bushel boxes with 8 different mixtures of CO_2 and O_2. With storage at 12·7° C. for 12 weeks, 5% CO_2 + 2·5% O_2 gave the best ripening results, but 2·5% CO_2 + 2·5% O_2 gave the minimum development of fungal decay. Increased CO_2 and reduced O_2 concentrations both retarded ripening although the O_2 effect could only be detected in the after-ripening period in air. [For earlier work see *H.A.*, 31: 2650.]—Canada Dep. Agric., Kentville, N.S.

TOBACCO.

General.

(*See also* 7245.)

6497. Sardone, L. T.
Australian tobacco.
World Crops, 1961, **13**: 227-30, illus.

Distribution, varieties, culture, processing, pest and disease control briefly described.

6498. Willets, H. J., and Lea, H. W.
The tobacco industry in north-western New South Wales.
Agric. Gaz. N.S.W., 1961, **72**: 36-9.

Shortage of irrigation water, blue mould and root-knot nematodes are the main problems in this area; two promising hybrid lines show blue mould resistance.

6499. Canada.
Progress Report Tobacco Division, Canada Department of Agriculture, 1954-1958, 1961, pp. 32.

Varietal improvement: Breeding programmes are reported in which characteristics sought include earliness, black root rot resistance, mosaic resistance, low Ca content and low alkaloid content. In irradiation studies using X- and gamma rays injury occurred and germination was severely reduced when tobacco seeds received dosages of over 30,000 r. No visible effects on germination or growth were observed with dosages below 20,000 r., but dosages from 20,000 to 30,000 r. affected leaf type and flower formation. *Agronomy:* In fertilizer trials the application of P_2O_5 at 150 lb./acre significantly increased yield and quality. Applications of sodium carbonate and calcium sulphate did not significantly affect the yield or quality of cigar tobacco. The trials also showed that a large part of the K in fertilizers may be replaced by Na without harmful effects to the tobacco. The quality and yield of cigar tobacco were improved by a combination of partial priming and stalk-cutting when harvesting the leaves; the best results were obtained with 3 primings of 10 leaves before stalk-cutting. In studies on a 2-year rye-tobacco rotation applications of 50 lb. N in the form of ammonium nitrate to the rye improved the grade of tobacco, and the later the date of sowing of the rye, the better was the effect on the tobacco. All chemical treatments tested decreased sucker growth, and MH-30 (2·25 lb./acre) and mineral oil emulsion (3 c.c./plant) increased yields. Methyl bromide (1 lb./70 sq. ft. of seed-bed) gave good weed control and plant production. *Physiology and nutrition:* Studies on growth and nicotine synthesis are reported. The best soil temperature for growth was 72° F.; P was the most important nutrient element for growth at lower soil temperatures. Yields were increased with high N supplies when these were combined with medium Ca and when K was supplied as chloride. Moderate acidity in the root medium favoured the uptake of P by the tobacco plant. Gibberellic acid reduced the nicotine content of tobacco. The turbidity of a cleared aqueous leaf extract when silicotungstic acid is added was found to provide a rapid visual estimate of tobacco alkaloids.

Flue-cured tobacco had the lowest total volume of pores in the cured leaf, followed by cigar and burley.

6500. Buys, C. J., and Möller, C. A.
Economic survey of tobacco farming in certain irrigation regions in Transvaal.
Bull. S. Afr. Dep. agric. Econ. Mktg **373**, 1961, pp. 41.

Tobacco areas, yields, production costs and income.

6501. Crouse, R. H.
Production of aromatic tobacco.
Folder N.C. agric. Ext. Serv. **194-61**, 1961, 1 folded sheet, illus.

Notes on culture, harvesting and processing.

6502. Anitia, N., and Ioan, I.
The fundamental morphological characteristics for the botanical description of tobacco. [French and English.]
CORESTA Inf. Bull., 1960, No. 4, pp. 17-32, illus.

The shapes of the plant, the leaf and the inflorescence considered in great detail with numerous line drawings.

6503. Sastry, A. S., and Murty, K. S. N.
Measurement of thickness of the tobacco leaf.
Indian Tobacco, 1961, **11**: 33-5, bibl. 2.

Leaf discs from Harrison Special were exposed to 43% R.H. over a saturated potassium carbonate solution and to 53% R.H. over a saturated magnesium nitrate solution until a constant moisture was attained after 72 hours. Thickness was then determined. Potassium carbonate gave the more closely reproducible results.—Cent. Tob. Res. Inst., Rajahmundry.

Breeding and varieties.

(*See also* 6498, 6499, 6553.)

6504. Goodall, D. W.
Breeding tobacco resistant to blue mould.
Reprint from *Aust. Tob. J.*, September 1960, pp. 10-11, 14.

An outline of Australian work using *Nicotiana debneyi*, *N. goodspeedii* and *N. knightiana*, and including mention of very promising hybrids of flue-cured type produced by H. Lea in N.S.W.

6505. Vickery, L. S.
New varieties called Delhi 61, Yellow Gold.
Canad. Tob. Gr, 1961, **9**(3): 13, from *Tob. Abstr.*, 1961, **5**, Abstr. 1244.

Delhi 61 is from a cross between Delcrest and Vamorr 50. It is nearly twice as tolerant to weather fleck as Delcrest, at present the most tolerant commercial variety, and produces yields higher than Hicks, Delcrest or White Gold. The cured leaf is of medium quality. Yellow Gold is quite tolerant to black root rot but not very tolerant to weather fleck. It is from a cross between Virginia Gold and Hicks. Yellow Gold has consistently produced higher yields, grades and returns per acre than the commercial varieties.

6506. Seibert, T.
Ergebnisse von Grossanbauversuchen mit den Zigarrengutsorten Geudertheimer und Tanta im Jahre 1960. **(Results of extensive field trials of the cigar tobacco varieties Geudertheimer and Tanta in 1960.)**
Dtsch. Tabakbau, 1961, **41**(6): 41-2, from *Tob. Abstr.*, 1961, **5**, Abstr. 1242.

In trials in West Germany with these varieties fertilizer form and preceding crop had no effect on yield. Blue mould affected yields, but when its incidence was disregarded, Geudertheimer yielded between 25·8 and 36·8 dz. [100 kg.]/ha. and Tanta between 30·4 and 41·4 dz./ha. The average yields and relative values for Geudertheimer and Tanta were 28·6 and 33·0 dz./ha. and 100 and 115, respectively.

6507. Tamboenan, W. G. P. T., Abdullah, A., and Auzay.
Penjelidikan memperoleh varietas tembakau Virginia jang tjotjok buat daerah Bodjonegoro. **(Research in Virginia tobacco varieties for the Bodjonegoro region.)**
Tehnik Pertanian, 1959, **8**: 349-496, from abstr. in *Indones. Abstr.*, 1961, **3**(1): 13-14.

After 4 years' selection work the variety S 551 Dixie Bright 101 has shown itself resistant to *Phytophthora* and water-logging, the main causes of crop failure in E. Java.

6508. Sand, S. A., and Taylor, G. S.
C2, a new mosaic resistant Connecticut broadleaf tobacco.
Bull. Conn. agric. Exp. Stat. **636**, 1961, pp. 4, illus.

A hybrid of *Nicotiana tabacum* × *N. glutinosa*, yielding 25% more than the standard variety, Kupchunos Broadleaf.

6509. Kosmodem'janskij, V. N., and Demčenko, T. I.
New improved tobacco varieties of the Ostrolist type. [Russian.]
Tabak, 1961, **22**(2): 19-21.

Ostrolist 2747-II is immune to tobacco mosaic, and Ostrolist 450 shows high resistance, in the seedling stage, to black root rot. The yield and quality of both selections are high.

Seeds and seed-beds.

(*See also* 6250, 7269.)

6510. Čirkovskij, V. I.
Factors influencing the productivity of tobacco seeds. [Russian.]
Tabak, 1961, **22**(2): 23-5.

The influence of conditions of seed production and storage on the germination of tobacco seeds and on seedling production is discussed. The conclusion reached is that a single factor, such as R.H., can have diametrically opposed effects when operating at different stages of plant development. Seeds of varieties developed under arid conditions showed more intense biological activity in the post-harvest period than those of humid zone varieties. Exposure to low humidity during the ripening period only retarded the biological processes in the seeds. [See also *H.A.*, 31: 4722.]

6511. Petrov, R.
The use of polythene film for raising tobacco plants. [Bulgarian.]
Bulg. Tjutjun, 1959, **4**: 19-20, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 61/83.

The temperature in frames covered with polythene 1 mm. thick was 2–3° C. lower than that in glass-covered frames. Young plants from polythene-covered frames were ready for transplanting a few days after those from glass frames, but were still 9 days earlier than those raised in the open.

6512. Dmitriev, M. F.
Raising mahorka seedlings in frames under polyamide film. [Russian.]
Tabak, 1961, **22**(2): 21-3, illus.

In double-span frames covered with polyamide plastic the average air temperature was 1·1° C. higher, and the soil temperature 2° C. higher, than in conventional glass-covered frames. Mahorka seedlings under the plastic grew and developed faster than under glass and were ready for transplanting 4 days earlier. Plants raised under the plastic produced 6·6% higher yields than those raised under glass.

6513. Mitskovski, J.
Application of Vapam for disinfection of the soil in tobacco seed-beds. [Serbo-Croatian.]
Duvan, 1960, **10**: 1-13, illus., from *Tob. Abstr.*, 1961, **5**, Abstr. 96.

The treatment of tobacco seed-beds with 1% Vapam (10 l./sq. m.) 20 days before sowing gave the following positive results: seedling development was accelerated, plant width and height were significantly greater, the number of healthy plants was increased 2·5-fold, the total weight of transplantable seedlings was 2·7 times greater, weeds were decreased 6·3-fold, plant pulling time was reduced to about one third, black root rot fungi were completely destroyed, as were *Amaranthus* sp. and *Heliotropium europeum*; the number of *Portulaca oleracea* weeds was decreased 7·5 times and *Trifolium* sp. somewhat less. [See also *H.A.*, 31: 4728.]

6514. Nichols, B. C., and McMurtrey, J. E., Jr.
Fertilizing burley tobacco plant beds.
Bull. Tenn. agric. Exp. Stat. **294**, 1959, pp. 21, illus., from *Tob. Abstr.*, 1961, **5**, Abstr. 504.

In one experiment 4–12–8 fertilizer was applied in the spring at rates of ½, 1 and 2 lb./sq. yd.; 0–12–8 fertilizer was also applied in the autumn followed by 4–0–0 in the spring [also at 3 rates]. In general, similar numbers of usable tobacco plants were obtained with the 3 autumn fertilizer rates and with the 3 spring fertilizer rates—both at the first pulling and in season totals. As compared with spring fertilizer applications, autumn applications resulted in poorer plant stands and lower plant production. Autumn fertilizer applications, however, often resulted in satisfactory plant production. In another experiment responses to N, P and K were determined. Where P was omitted, early plant production was not satisfactory in any year. Comparatively large responses in plant production were obtained from both N and P. Very little response was obtained from K. The results obtained suggest that ½ lb./sq. yd. of 4–12–8 fertilizer applied in the spring would usually be adequate.

Planting, cultivation and de-suckering.

(*See also* 5965, 7264, 7269.)

6515. Splinter, W. E.
Transplanting tobacco; pick the right plants.
Res. and Fmg, N.C., 1960, **18**(4): 6, illus.

For another account see *H.A.*, 30: 819.

6516. Patel, G. C., Singh, M., and Das, R.
Effect of double transplanting on the yield of tobacco.
Indian Tobacco, 1961, **11**: 37-42, illus.

Seedlings of Motihari (*N. rustica*) and cigar wrapper (*N. tabacum*) tobacco were either pricked out when 3 weeks old into freshly prepared beds at 4 × 3 in. spacing and transplanted into the field 3–4 weeks later or transplanted directly into the field from the seed-bed. Initial growth was greatly improved by double transplanting, but no significant difference in the yield of cured leaf was obtained.—Wrapper and Hookah Tob. Res. Stat., Dinhata.

6517. Engle, H. B., McMurtrey, J. E., Jr., and Brown, D. E.
Maryland tobacco—an evaluation of field cultural practices and their interactions.
Bull. Md agric. Exp. Stat. **A-110**, 1960, pp. 21, illus., from *Tob. Abstr.*, 1961, **5**, Abstr. 583.

In one experiment close-spaced tobacco in double rows (24 × 25 in.) grown on a ridge or on the level yielded significantly less than that grown on ridge, level or hill at 34 × 34 in. spacing and that grown in single rows at 68 × 17 in. spacing. Quality and burn were not affected by the various ridge or level treatments. Leaf size under crowded conditions was not significantly different from leaf size under normal conditions, with the same population and fertilizer per unit area. Burn was not correlated with quality. In this experiment burn was notably better the first season following a natural weed fallow than in either of the succeeding years, one of them dry and the other relatively wet. There was no advantage in side placement of fertilizer over application in the row, so far as yield or value per acre was concerned. In a second experiment 2,000 lb./acre of 4–8–12 fertilizer caused a highly significant increase in yield, value per acre and moisture capacity of the cured leaf. A 750 lb. rate significantly improved quality and increased the duration of burn and unit dry weight of leaf tissue. Spacing at 33 × 36 in. increased yield, value per acre and duration of burn compared with spacing at 26 × 45 in. A population increase of 38% increased yield by 28% and acre value by 30%, and reduced unit dry weight of leaf tissue. The only significant interaction took place between population and fertilizer rate. Yield and acre value were relatively greater for a high population receiving increased fertilizer than for a standard population. Topping improved quality and increased acre value and dry weight of leaf over no topping. High topping increased yield and acre value over no topping and low topping, and increased dry weight of leaf over no topping. Low topping improved quality over high topping, and increased the unit dry weight over high topping and no topping. No topping led to improved burn. Suckering at intervals increased dry weight of leaf over one pre-harvest suckering. Delaying suckering until harvest improved quality.

6518. Ivančeva-Gabrovska, T., and Dimitrov, D. G.
Studies on the effect of de-blossoming and de-suckering on resistance to black shank. [Bulgarian.]
Bjul. Rast. Zaščita, 1958, **7**: 72-91, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 61/26.

Flowering tobacco plants (var. Rila) were more severely infected with *Phytophthora* than were de-blossomed plants. The proportion of diseased plants was higher with irrigation. The most favourable results were obtained when the plants were de-blossomed at full bloom and also de-suckered regularly.

6519. Sastry, A. S., Kurup, C. P. R.
Control of suckers in chewing tobacco by the use of chemicals.
Indian Tobacco, 1961, **11**: 43-51, bibl. 5.

Applications of 1 drop per plant of 2% NAA in triethanolamine solution at the time of topping and again 1 week later gave 68–79% control of suckers in Valmonnai tobacco. Manual de-suckering may be necessary in seasons when sucker growth is vigorous.—Cent. Tob. Res. Inst., Rajahmundry.

Drought resistance and irrigation.

(*See also* 6518.)

6520. Sficas, A. G., Jones, G. L., and Seltmann, H.
Factors affecting drought resistance in tobacco.
Tobacco, N.Y., 1961, **152**(13): 19-24, bibl. 10.

A burley variety, an oriental variety and 4 flue-cured varieties were used in this study. Small leaf area was found to be most important in conferring drought resistance; good root development was next in importance and then water absorption capacity (osmotic pressure). Although small leaf area is undesirable in a commercial variety, differences in leaf shape may help to reduce transpiration, and it may be possible to raise varieties with a high yield : leaf area ratio.—N.C. Stat. Coll., Raleigh.

6521. Jones, J. N., Jr., Sparrow, G. N., and Miles, J. D.
Principles of tobacco irrigation.
Agric. Inf. Bull. U.S. Dep. Agric. **228**, 1960, pp. 16, bibl. 1, illus.

Economics, soil moisture deficiency determination and irrigation rates. [Already abstracted from another source in *H.A.*, 31: 4742.]

Nutrition and mineral composition.

(*See also* 5654-5656, 6499, 6514, 6517, 6555, 6559, 7269, 7289.)

6522. Venkataraman, K. V., and Tejwani, K. G.
Further studies on the nutritional balance in flue-cured tobacco: interrelationships between cations accumulated in the leaves.
Soil Sci., 1961, **91**: 324-7, bibl. 14.

The studies indicate the following relationships in the nutritional balance of flue-cured tobacco leaf: (a) Ca depresses the accumulation of K in the leaf; (b) Mg has little direct influence on the accumulation of K; (c) Ca and K promote the accumulation of Mg in the leaf; and (d) both Mg and K influence the accumulation of Ca in the leaf, the former promoting it and the latter depressing it. These studies explain why the total cation content of leaves of varying composition is not always a constant in flue-cured Virginia tobacco. [From authors' summary. For earlier work, see *H.A.*, 29: 1563.]—Cent. Tob. Res. Inst., Rajahmundry, India.

6523. Tso, T. C., McMurtrey, J. E., Jr., and Sorokin, T.
Mineral deficiency and organic constituents in tobacco plants. I. Alkaloids, sugars and organic acids.
Tso, T. C., and McMurtrey, J. E., Jr.
Idem. II. Amino acids.
Plant Physiol., 1960, **35**: 860-4, bibl. 11, and 865-70, bibl. 7.

Seedlings were grown in nutrient solutions deficient in N, P, K, Ca, Mg, S or B. Topped plants and those which had stopped growing because of B or Ca deficiency had the highest alkaloid contents. Untopped control plants appeared to have a higher total sugar content. B-deficient plants had a higher total organic acid content than untopped control plants. A deficiency of each of the elements except N caused an increase in the amino-acid content; Ca and B deficiency had the greatest effect.—U.S.D.A., Beltsville, Md.

6524. SAMUELS, G.
The influence of fertilizers on cigar-filler tobacco quality. [Spanish summary ¾ p.]
J. Agric. Univ. P.R., 1960, **44**: 194-207, bibl. 6.

The effects of N at 50, 100 and 150 lb. per acre, K_2O at the same levels, P_2O_5 at 50 and 100 lb., lime at 1,000 and 2,000 lb., and MgO at 300 lb. on the quality of the leaf were studied in one experiment, and the influence of the type of N-fertilizer on both yield and quality in a second. Quality was improved by 50 lb. N, the lime and MgO, but not by K_2O or P_2O_5. Higher rates of N did not increase or decrease quality. No effect on quality could be observed when the type of N was changed, but urea resulted in the slowest burning rate and a mixture of urea and cottonseed meal in the fastest. Increasing N fertilization to the 100 lb. level raised the nicotine content of the leaf, whereas P and K tended to lower it.

6525. HRISTOSOV, D.
Results of row manuring of tobacco with mineral fertilizers. [Bulgarian.]
LandwBl., Sofia, 1958, **3**: 713-15, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 61/94.

At the Tobacco Research Station at Charmanli broadcasting and row placement of fertilizers was compared. All fertilized plants flowered about 10 days earlier than unfertilized plants. Yield increases following broadcasting a complete fertilizer and row placement using half the rates of the complete fertilizer were similar in 2 seasons, but leaf quality of the row-fertilized plants was better.

6526. GOWAIKAR, A. S., AND SHAW, C. C.
Effect of NPK manuring on bidi tobacco. (Keliu K-49).
Indian Tobacco, 1961, **11**: 53-9, bibl. 14.

The time elapsing between transplanting and topping was reduced progressively from 88 to 50 days as the N application was increased from 0 to 240 lb./acre, but was not affected by P and K applications. Leaf length was increased by N, P and K applications, but leaf breadth and yield were increased only by N applications. Higher levels of P resulted in decreased yields when N was not present. The leaf N content was reduced by applications of P_2O_5 at 160 lb. and 240 lb. Increased N applications increased the K_2O, SO_4 and nicotine contents and reduced the CaO, MgO and chloride contents. P increased the chloride content, and K increased the chloride and nicotine contents.—All India Soil Land Use Survey, Nagpur.

6527. HRISTOSOV, D.
Results of top-dressing non-irrigated tobacco during the vegetative period in the district of the Tobacco Research Station in Charmanli. [Bulgarian.]
Bulg. Tjutjun, 1959, **4**: 197-9, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 61/59.

Yields were increased by 14% when a single top-dressing of complete fertilizer was applied in the spring. The highest yields with ammonium nitrate were obtained with a split application programme giving half the dosage at planting out, and the other half divided between applications at the first and second hoeings.

6528. YOSHIDA, D., AND TAKAHASHI, T.
Behaviour of nutrients absorbed by the tobacco plant. (Part 1). Behaviour of phosphorus absorbed by the tobacco plant.
J. Sci. Soil, Tokyo, 1960, **31**: 411-14, from abstr. in *Soil Plant Food*, 1961, **6**: 193.

Labelled P was supplied to the plants at 3 growth stages. In the first 30 days and the subsequent 20 days P was mostly distributed in the upper leaves; during the final 30 days in the stem and root. This was most marked at relatively low levels of P supply.—Hatano Tob. Exp. Stat.

6529. MCEVOY, E. T.
The influence of temperature of the culture medium on uptake of phosphorus by flue-cured tobacco.
Lighter, 1961, **31**(1): 28-30.

A short account of work reported in *H.A.*, 30: 5677.

6530. CONNORS, W. M., AND HESS, E. H.
The determination of calcium in tobacco.
Tobacco, N.Y., 1961, **152**(8): 23-7, bibl. 6.

The standard volumetric (titration of oxalate) method is considered unsatisfactory, and a gravimetric method, in which the precipitated oxalate is converted to the carbonate for weighing, is recommended. These values afford a basis for dry matter loss correction during curing.—Gen. Cigar Co., Lancaster, Pa.

6531. KASAI, Z., AND KONISHI, S.
The behaviour of calcium during the ageing and death of the tobacco plant.
J. Sci. Soil, Tokyo, 1960, **31**: 317-20, from abstr. in *Soil Plant Food*, 1961, **6**: 187-8.

Ca^{45} was found to accumulate mostly in the leaf above the largest one at the time of treatment, the content decreasing gradually in the upper and lower leaves. There was very little redistribution of Ca as the leaves aged and died.—Kyoto Univ.

Physiology and biochemistry.

(*See also* 5609, 6499, 6522, 6523, 6544, 6553, 6563.)

6532. Aksenova, N. P.
The effect of day length on glycolytic activity and on the tricarboxylic acid cycle. [Russian, with English summary ⅓ p.]
Fiziol. Rast., 1961, **8**: 338-44, bibl. 16.

The short-day tobacco variety Mammoth, the long-day *N. sylvestris*, and rudbeckia were among the plants used in this experiment. Glycolysis was slightly increased by short-day induction and non-glycolytic transformation by long-day induction, the daily range and total activity of the Krebs cycle being unaffected. It is concluded that respiratory processes are those most affected by photoperiodism, glycolysis to a lesser degree and the tricarboxylic acid cycle not at all.

6533. Solt, M. L., Dawson, R. F., and Christman, D. R.
Biosynthesis of anabasine and of nicotine by excised root cultures of *Nicotiana glauca*.
Plant Physiol., 1960, **35**: 887-94, bibl. 22.

The simultaneous production rates of anabasine and of nicotine by excised root cultures of *Nicotiana glauca* were analysed in relation to the root growth rate. Nicotine production was simply proportional to root dry weight yields, but anabasine production was proportional to the product of root dry weight and the length of the culture period. These relationships are interpreted as indicating that anabasine and nicotine synthesizing functions are restricted to different compartments in the root system. It was not possible to increase the chemical yields of anabasine or of nicotine, or to influence the relative proportions in which they were produced, by supplying nicotinic acid alone or in combination with ornithine or lysine. [From authors' summary.]—Columbia Univ., N.Y.

6534. Dawson, R. F., and Solt, M. L.
Gibberellic acid inhibition of nicotine biosynthesis.
Pap. 14th Tob. Chem. Res. Conf., Winston-Salem, N.C. **22**, 1960, from *Tob. Abstr.*, 1961, **5**, Abstr. 247.

When both GA and labelled nicotine were supplied to sterile tobacco root cultures the GA affected the rate of incorporation of endogenous precursors of nicotine to a far greater extent than the rate of incorporation of exogenous percursors (isotopically labelled nicotinic acid and ornithine). The results indicate that the point of action of GA on the biosynthetic pathway lies somewhere between nicotinic acid and ornithine on the one hand and nicotine on the other. It is pointed out that this is also the area in which the rate-limiting step for both nicotine synthesis and root growth appears to occur.

6535. Engelbrecht, L., and Mothes, K.
Kinetin als Faktor der Hitzeresistenz. **(Kinetin as a factor in heat resistance.)**
Ber. dtsch. bot. Ges., 1960, **73**: 246-57, illus., from *Tob. Abstr.*, 1961, **5**, Abstr. 488.

Heating leaves of *Nicotiana rustica* at just below lethal temperatures caused invisible damage to the leaf. This was followed by rapid leaf yellowing if another leaf having greater vitality was located so as to be able to divert amino acids from the heat-treated leaf. The heat-treated leaf appeared to have aged physiologically in comparison with an untreated leaf of the same age. The heat resistance of the leaf was increased by kinetin sprayed onto its surface. The effect of kinetin was reflected in the active accumulation of amino acids, whereby the protein content of the heat-treated leaf could be maintained or even increased.

6536. Sargent, J. A., and Skoog, F.
Effects of indoleacetic acid and kinetin on scopoletin-scopolin levels in relation to growth of tobacco tissues *in vitro*.
Plant Physiol., 1960, **35**: 934-41, bibl. 21, illus.

The levels of scopoletin and its glucoside, scopolin, were investigated in both tobacco pith and tobacco callus grown *in vitro* and supplied with various concentrations of IAA and kinetin over a period of 24 days. The amount of scopoletin released to the medium under these conditions was also determined. The effect of temperature on these levels was observed. It is concluded that the formation of scopolin by the tissue is dependent upon a supply of kinetin, and that a steady state equilibrium exists between this glycoside and its aglycone. In healthy tissue the scopolin: scopoletin ratio is extremely high, a value of approximately 13:1 being observed. Under conditions which favour growth scopolin is converted to a non-fluorescent substance presumed to be utilized in the growth process. Degradation to scopoletin is accelerated by a high supply of IAA or injury to the tissues. Death or abnormally functioning cells result in release of scopoletin to the medium. [From authors' summary].—Univ. Wis., Madison.

6537. Jacobson, J. S.
The brown pigments of autolyzed tobacco leaves. I. Isolation and characterization. II. Incorporation of labeled rutin and chlorogenic acid.
Arch. Biochem. Biophys., 1961, **93**: 580-90, bibl. 33, and 591-7, bibl. 6.

Part I: The brown pigments in the leaves of shade-grown tobacco were isolated and partially purified. Experiments are described, the results of which suggest that the brown pigments may consist of a combination of polyphenols, notably chlorogenic acid and rutin, with protein. *Part II:* Chlorogenic acid and rutin, both labelled with C^{14}, were biosynthesized, isolated from a tobacco plant and supplied to excised leaves of shade-grown tobacco. When brown pigments had formed these were isolated and their radioactivities measured. The pigmented fractions contained a significant proportion of the radioactivity taken up by the leaves. Where labelled chlorogenic acid had been supplied the pigment yielded considerably more activity in quinic acid than in rhamnose and glucose, whereas the reverse was true of pigment from leaves that had been supplied with rutin.—Dep. Bot., Columbia Univ., N.Y.

6538. Stedman, R. L., and others.
Acids and esters of flue-cured tobacco.
[*Publ.*] *U.S. Dep. Agric.* **ARS 73-31**, 1960, pp. 16, bibl. 24.

The isolation and quantitative determination of certain acids and esters from tobacco are described. Based on infra-red spectrophotometric and gas chromatographic findings, the compounds were tentatively identified as free higher fatty acids and methyl and ethyl esters thereof. [Authors' abstract.]—East. Utiliz. Res. Develop. Div., Philadelphia.

Disorders, diseases and pests.

(*See also* 5725, 5729, 5730, 6506, 6518, 7264, 7269.)

6539. Bertinuson, T. A., LeCoultre, H., and Waterman, W. C.
The inhibitory effect of zinc ethylene bisdithiocarbamate dust on weather fleck of Connecticut shade-grown tobacco.
Tobacco, N.Y., 1961, **152**(10): 21-4, bibl. 5.

A 25% zinc ethylene bisdithiocarbamate dust applied at 25–30 lb./acre weekly, or more frequently if necessary, reduced weather fleck injury on shade-grown tobacco by 50%, and was especially effective if applied before the ozone content of the atmosphere reached a critical level.—Cullman Bros., Inc., Hartford, Conn.

6540. Ulrychová, M., and Blattný, C.
L'action synergique de la simazine et des viroses de plantes en tant que méthode de la détection éventuelle des maladies à virus. **(The synergistic action of simazine with plant viruses considered as a possible means of detecting plant virus infections.)** [Czech and Russian summaries 7 lines each.]
Biol. Plant., Prague, 1961, **3**: 122-5, bibl. 6, illus.

Healthy and TMV-infected Samsun tobacco plants were sprayed with simazine at 0·33 mg. and 0·50 mg. per plant. The healthy plants showed only a mild chlorosis or no reaction at all, whereas the leaves of infected plants started to dry up after the 10th day.—Biol. Inst. Czech. Acad. Sci., Prague.

6541. Bhan, K. C.
Inactivation of tobacco mosaic virus by ultraviolet radiation.
Indian J. Plant Physiol., 1960, **3**: 195-200, bibl. 22.

In the U_1 and U_2 strains of TMV the nucleic acid fractions were capable of producing infection in *N. glutinosa*. These fractions had approximately the same sensitivity to UV radiation as the intact viruses, the U_2 strain having only one fifth of the resistance of U_1.—Banana Res. Scheme, Chinsura, W. Bengal.

6542. Yarwood, C. E.
Soil inhibits infection with tobacco necrosis virus.
Plant Dis. Reptr, 1960, **44**: 639-42, bibl. 12.

Results of several experiments indicated that some soils inhibit the infection of roots of tobacco and other plants by tobacco necrosis virus.

6543. Ivanceva-Gabrovska, T.
La lotta in Bulgaria ad un virus del tabacco. **(Control measures in Bulgaria against a tobacco virus.)**
Progr. agric., Bologna, 1961, **7**: 491-4, illus.

The tomato spotted wilt virus is transmitted to tobacco by *Thrips tabaci*, which is controlled by deep ploughing in autumn, and by treating seedbeds and plantation soils shortly before use with 50 kg. of 12% BHC per ha. mixed with the top 10 cm. of soil. After emergence the seedlings are sprayed every 7–10 days with one of the phosphoric esters or with Ekatin, and these treatments can be combined if necessary with the application of a copper fungicide. After transplanting the intervals between treatments are increased to 10–15 days. One factor essential to success is the promptness of the first treatment in each phase. Application by aircraft has proved very successful.

6544. Shepherd, J., and Mandryk, M.
The free amino acids of tobacco plants infected with *Peronospora tabacina*.
From abstr. in *Aust. J. Sci.*, 1960, **22**: 479.

Stem injection with the fungus led to resistance to subsequent foliar infection. Both stem injection and leaf infection increased the total content of free amino acids and the contents of aspartic acid, glutamic acid, arginine and alanine.—C.S.I.R.O., Canberra.

6545. Kosswig, W.
Die Blauschimmel-Krankheit des Tabaks und ihre Bekämpfung in den Saatbeeten mit Paradichlorbenzol. **(Blue mould and its control by treatment of seed-beds with paradichlorbenzene.)**
Dtsch. Tabakbau, 1960, **40**(7): 59-62, from *CORESTA Inf. Bull.*, 1960, No. 4, Abstr. 4384.

Paradichlorbenzene is used at 1 g. for 1·5 sq. m. of glass. The chemical, in tablet form, is placed on gauze laid upon the seed-beds at night, and must be removed at sunrise unless the bed temperature has fallen below 7° C. In this case the tablets may stay until the beds warm up to 23–26° C. Treatment should begin, as a preventive measure, as soon as the seedlings have 2–3 leaves, or as a cure at the least sign of infection, and it should be continued until the seedlings are planted out.

6546. ANON.
Blauschimmelkrankheit an Tabak. **(Blue mould of tobacco.)**
Dtsch. Tabakbau, 1960, **40**(15): 1, from *CORESTA Inf. Bull.*, 1960, No. 4, Abstr. 4400.

Control was obtained with formulations of the maneb group which were applied as sprays at the rate of 200–300 g. per 100 l. of water and 1,200 l./ha., with the addition of a wetting agent. Standing crops should not be destroyed by ploughing, since the fungus can survive over winter. It is advisable to make a hot compost of the plant refuse with the addition of nitrogen and lime.

6547. SCHMID, K.
Über Tabakperonospora-Bekämpfung mit Maneb. **(Control of *Peronospora* on tobacco with maneb.)**
Dtsch. Tabakbau, 1961, **41**(2): 9-11, illus., from *Tob. Abstr.*, 1961, **5**, Abstr. 602.

Greenhouse trials on the variety Havanna 9 showed that regular spraying of the plants with a 0·1% solution of maneb with a wetting agent (Pril) would give good control of tobacco blue mould. If there is danger of severe infection, the maneb concentration should be raised to 0·2%.

6548. MOTSINGER, R. E., AND MORGAN, O. D.
Control of root-knot nematode and aphid on tobacco.
Plant Dis. Reptr, 1960, **44**: 399, illus.

Excellent control of *Meloidogyne* sp. and *Myzus* sp. on tobacco was achieved in pot experiments by either a pre-planting or a post-planting application of 5% granular 0,0-diethyl 0-2 pyrazinyl phosphorothioate (Chemical 18133, American Cyanamid Co.) to the upper 4 in. of soil at rates equivalent to 10 and 20 lb./acre. The compound is systemic, and produces a stunting of the plants and small spots on the lower leaves, but these effects are temporary.—Univ. Md, College Park.

6549. DOMINICK, C. B.
Experiments for early-season control of the green peach aphid on tobacco.
J. econ. Ent., 1960, **53**: 1099-101, bibl. 4.

Phorate and demeton applied in the transplant water gave excellent control of *Myzus persicae* on tobacco for about 6 weeks; their commercial use, however, is not recommended owing to the low margin of plant safety. Phorate as a plant-bed drench or as a post-transplanting foliage spray gave poor results. In a 2-application programme used for the control of other insects both sprays and dusts of Guthion, thiodan and endrin and sprays of Shell SD 4402 gave very good results in preventing a build-up of the aphid.—Va agric. Exp. Stat., Chatham.

6550. ALLEN, N., KINARD, W. S., AND CREIGHTON, C. S.
***Bacillus thuringiensis* controls the tobacco budworm.**
Tobacco, N.Y., 1961, **152**(19): 19-24, bibl. 2, illus.

Water-suspension sprays of *B. thuringiensis* var. *thuringiensis* were only partially successful in controlling *Heliothis virescens* in the 1957 and 1958 experiments in S. Carolina. In 1959, however, corn meal or wheat flour baits with bacillus inoculum applied by hand to the buds produced a high mortality and were as effective as the best chemical insecticides. The 1960 trials indicated that this treatment was not only immediately effective but gave protection against subsequent infestation for some days.—U.S.D.A. and S.C. agric. Exp. Stat., Florence.

6551. KURUP, A. R., AND JOSHI, B. G.
Investigation on the control of tobacco caterpillars (*Prodenia litura* F.) in nursery and field.
Indian J. Ent., 1959, **21**: 10-14, illus., from *Tob. Abstr.*, 1961, **5**, Abstr. 1318.

DDT 50% w.p. at 2 lb./100 gal. on the seed-bed and 4 lb./100 gal. in the field recommended as a result of experiments.

6552. PATEL, R. C., AND PATEL, H. K.
Control of tobacco stem borer, *Gnorimoschema heliopa* Low (Gelechiidae: Lepidoptera).
Indian Tobacco, 1961, **11**: 61-4, bibl. 6.

The stem borer was controlled by applications, every 15 days from transplanting to topping, of 0·01% endrin e.c. (3·2 oz./40 gal.), 0·05% dieldrin 50% w.p. (6 oz./40 gal.), 0·05% aldrin 40% w.p. (8 oz./40 gal.), 0·20% DDT 50% w.p. (1·6 lb./40 gal.); or 0·03% Folidol e.c. (50 c.c./40 gal.), the cheapest treatment being with endrin. BHC and toxaphene were phytotoxic to tobacco.—Inst. Agric., Anand.

6553. TUTEL, B.
Quelques recherches morphologiques, anatomiques et physiologiques sur le *Nicotiana tabacum* L. de Malatya et de Bursa, du point de vue de leur résistance contre *Thrips tabaci* Lind. **(Morphological, anatomical and physiological investigations on the tobacco varieties Malatya and Bursa, in relation to their resistance to *Thrips tabaci*.)**
Rev. Fac. Sci. Istanbul, Sér B, 1959, **24**: 171-223, from *CORESTA Inf. Bull.*, 1960, No. 4, Abstr. 4249.

The apparent preference of thrips for the variety Malatya, in contrast to the variety Bursa, is attributed to the presence of larger amounts of starch and oxalate crystals and of vessels and tracheids in the stalks and roots, more hairs and stomata on the leaves, a higher level of phosphates in the leaves, higher osmotic pressure and transpiration rate, and a lower water content and acidity in the leaves.

6554. Bowery, T. G., and Guthrie, F. E.
Determination of insecticide residues on green and flue-cured tobacco and in main-stream cigarette smoke.
J. agric. Food Sci., 1961, **9**: 193-7, bibl. 6.

Residue studies with Guthion and Sevin indicated that of the total residue present on green tobacco at priming time only 27 and 12%, respectively, were detectable after flue-curing, and only 0·3 and 1% in main-stream cigarette smoke. Thus tobacco plants treated at the recommended rates of 0·5 lb. Guthion or 1·0 lb. Sevin per acre will show no measurable contamination of main-stream cigarette smoke. [For related work, see *H.A.*, 30: 887.]—N.C. St. Coll., Raleigh.

6555. McCants, G. B., and Small, H. G., Jr.
Arsenic in tobacco.
Res. and Fmg, N.C., 1960, **18**(4): 14.

Regardless of the amount of As applied to 3 different soil types, only limited amounts were absorbed by the tobacco.

Processing and by-products.

6556. Žuravlev, N. V., Fedotenko, V. A., and Trubnikov, V. F.
A new method of fastening tobacco leaves on strings, and a machine for accomplishing this. [Russian.]
Tabak, 1961, **22**(2): 51-4, bibl. 7, illus.

A description is given of a machine, which instead of threading string through the petioles, as is usual, secures the petioles to a string by a chain-stitch. Many advantages are claimed for this method which is 2½ to 3 times faster than hand stringing.

6557. Winn, P. N., Jr., and Street, O. E.
Tobacco weight losses during curing.
Bull. Md agric. Exp. Stat. **A-111**, 1960, pp. 10.

During the first 10 days of curing whole tobacco plants lost 70% of their fresh weight, and in the next 10 days a further 18%, the moisture content falling from 87·6 to 30% over the 20-day period. Dry matter losses were 2%, the leaves losing 3·5–4% but the stalks gaining 1–2%. An equation is given relating loss in weight exponentially to the time of curing.

6558. Burton, W. W., and Wright, H. E., Jr.
Burley tobacco: the effects of harvesting and curing procedures on the composition of the cured leaf.
Tobacco, N.Y., 1961, **152**(15): 19-24, bibl. 17.

Normal air curing on the stalk results in a reduction in the contents of nicotine, other nitrogenous compounds and malic acid, but an increase in the contents of polyphenols and citric and oxalic acids. Removing the leaves from the stalks or using excessive heat tends to prevent these changes and reduces the smoking quality of the product. The taking of 2 primings, however, appeared justified because of the saving of leaves that would otherwise be wasted.—Amer. Tob. Co., Richmond, Va.

6559. Sastry, A. S.
Chemical examination of the grading of flue-cured tobacco.
J. sci. industr. Res., India, Sect. A, 1959, **18A**: 566-8, bibl. 6.

Flue-cured leaves of the variety Harrison Special, taken from a manurial trial in which F.Y.M. and N, P and K were compared with no manure, were graded by the usual Indian procedure, which is based mainly on colour, and then examined chemically. Grades 1–4, which are classified as good, were characterized by high contents of ash, soluble solids and total sugars and low total N and by high Kovalenko and Schmuck ratios. The reverse trends were apparent in inferior grades, in which the leaves showed various shades of green. In general, manuring with F.Y.M. or with N, P, K tended to reduce total sugars and increase amide N. [See also *H.A.*, 30: 5686.]—Cent. Tob. Res. Inst., Rajahmundry.

6560. Winn, P. N., Jr., and Burkhardt, G. J.
A tobacco stripping room conditioner.
Bull. Md agric. Exp. Stat. **469**, 1960, pp. 26, bibl. 5, illus.

Equipment is described which maintains the optimal environment in a stripping room, viz. 66° F. and 80% R.H. Under these conditions cured tobacco leaf can be kept in good order. By carefully handling one stick at a time cured leaf can be transferred to this room even in very dry weather, and stripping can be carried on continuously irrespective of climatic conditions.

6561. Petersen, E. L., Bergeron, L. A., and Hale, T. S.
Controlled fermentation of shadegrown tobacco.
Tobacco, N. Y., 1961, **152**(14): 25-30, bibl. 13.

The fermentation of shade-grown cigar wrapper tobacco packed lightly in paperboard cartons was compared with fermentation in bulk. The cartons were kept in rooms with gentle air circulation at 105–115° F. and 65–80% R.H. The CO_2 content of the air was nowhere more than 2% in the cartons as against 10% in the bottom of the bulks, and temperature variations were also much smaller in the former and reached equilibrium with the ambient air after 3 days. In consequence the cartons produced leaf of more uniformly high quality.—Consolidated Cigar Corp., Glastonbury, Conn.

6562. SLIFIRSKI, J.
Bobier-Lepigre's method of pre-accelerated fermentation. [Polish.]
Wiadom. Tyton., 1958, **2**(2): 32-3, from *CORESTA Inf. Bull.*, 1960, No. 4, Abstr. 4484.

Leaves containing 19–20% moisture placed in 80 × 80 × 40 cm. baskets are put into an autoclave under a pressure of 720 mm. of mercury. Superheated steam is then introduced, the pressure never falling below 500 mm. Humidification at 80° C. for 30 min. increases the leaf moisture content to 22–24%. When the pressure reaches 650 mm., 500 g. of ethylene oxide are introduced per 100 kg. of tobacco; the pressure falls to 600 mm., then increases again to 700–710 mm. for 20 min., and is finally held at 450 mm. for 2 hours. The tobacco is then ready to ferment either in a chamber at 60° C. for 48 hours or in bulk (35–40 kg. tobacco covered with a jute cloth) over about 20 days.

6563. CHAKRABARTY, M. K., AND CHAKRABARTY, M. M.
Investigation of less-known oils in hydrogenation industries: use of tobacco seed oil.
J. sci. industr. Res., India, Sect. A, 1959, **18A**: 530-3, bibl. 3.

The oil present in tobacco seeds in amounts up to 46% could be used for the *vanaspati* [hydrogenated fats] industry. The fact that relatively large amounts of hydrogen are needed would be more than offset by the relatively low cost of the oil. Data are given on the chemical and physical characteristics of tobacco seed oil both before and after various periods of hydrogenation.—Univ. Coll. Sci. Technol., Calcutta.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 5663, 6393, 6430.)

6564. MINISTRY OF AGRICULTURE, LONDON.
Culinary and medicinal herbs.
Bull. Minist. Agric., Lond. **76**, revised 1960, pp. 41, 3s.

In this new edition of the bulletin [see *H.A.*, 22: 4069 for 2nd edition] the division between culinary and medicinal herbs is removed, and a less obvious one is made between crops of commercial value and those of interest to domestic gardeners in Britain. This edition is not illustrated.

6565. PILLAI, S. K., PILLAI, A., AND SACHDEVA, S.
Root apical organization in monocotyledons—Zingiberaceae.
Proc. Indian Acad. Sci., Sect. B., 1961, **53**: 240-56, bibl. 34, illus.

Anatomical studies on the ginger-producing plants *Zingiber officinale* and *Z. zerumbet*, the turmeric-producing plants *Curcuma longa* and *C. aromatica*, the ornamental plants *Costus speciosus*, *Alpinia calcarata*, *Hedychium coronarium*, *Kaempferia galanga* and *K. rotunda*, and the cardamom *Elettaria cardamomum*.

6566. P[ICKERING], G. B.
Oil from nutmeg leaves.
Trop. Sci., 1961, **3**: 40.

Steam distillation yielded 0·65% of oil from green, and 0·34% from brown, leaves; this was chemically similar to true nutmeg oil, but its flavour and odour were markedly inferior.

6567. KRICKL, M.
Wurzelpetersilie. Wurzeltypen und deren züchterische Auslesen. **(Root parsley. Root types and their selective breeding.)** [English, French and Spanish summaries ¼ p. each.]
Mitt. Klosterneuburg, Ser. B, 1960, **10B**: 5-18, illus.

Selection to give forms with a single tap root is in progress. Yellowing of the leaves was found to indicate that plants are ready for harvesting. Trials with different planting dates showed that parsley planted in early autumn was attacked more or less severely by mildew, whereas later plantings remained healthy.

6568. GREGORY, L. E., ALMEYDA, N., AND THEIS, T.
The black pepper research programme in Puerto Rico.
From summary in *Proc. Carib. Reg. Amer. Soc. hort. Sci., 1960*, 1960, **4**(8th annu. Mtg): 64.

Preliminary results briefly noted of experiments on selection, culture, flowering and disease control at Mayagüez.

6569. HASAN-ILJAS, B.
Beberapa tjatatan tentang biologi bunga lada (*Piper nigrum* L.). **(Some notes on the flower biology of black pepper.)** [English summary ½ p.]
Pemb. Balai besar Penj. pert. **157**, 1960, pp. 22, bibl. 4, illus.

Floral morphology and anthesis are described. In the cultivated forms investigated the flowers were hermaphrodite and protogynous. Protandry was found in one wild form. Pollination took place by pollen falling onto lower flowers of the same raceme. Dwarf plants used for the investigation were obtained by grafting pieces of fruit-bearing shoots as scions onto stems of *P. hirsutum* or *P. arifolium* as rootstocks.

6570. ZINČENKO, D. P.
The cultivation of clary sage [*Salvia sclarea*] in the Kuban. [Russian.]
Agrobiologija, 1960, No. 6, pp. 942-3.

Yields for 1958 and 1959 averaged 72·5 centners/ha.; cultural details are recorded.

Drug plants.

(*See also* 5656, 5687, 6564.)

6571. BROOKER, S. G., AND COOPER, R. C.
New Zealand medicinal plants.
Econ. Bot., 1961, **15**: 1-10, bibl. 20.

Listed showing the parts used and their medical uses.

6572. MADAN, C. L., AND MUKERJI, B.
Biosynthesis of alkaloids in the plants.
J. sci. industr. Res., India, Sect. A, 1958, **17A**: 224-34, bibl. 122.

A review of literature, covering, among other things, the biosynthesis of alkaloids in tobacco, the tropane alkaloids, ricinine, lupinane alkaloids, the alkaloids in *Papaver somniferum* and cinchona alkaloids.

6573. CHOPRA, I. C., HANDA, K. L., AND ABROL, B. K.
Indian calamus: its scope in modern therapeutics.
J. sci. industr. Res., India, Sect. A, 1958, **17A**: 8-11, bibl. 14.

Acorus calamus may be cultivated like rice. An infusion of the dried rhizomes has medicinal uses. Rhizome tips are used for propagation and are best planted in March or April. The yield of rhizomes is about 1½ tons/acre about 1 year after planting.—Drug Res. Lab., Jammu.

6574. MÁTHÉ, I.
A kálmos (*Acorus calamus* L.) magyarországi termőhelyei. **(The habitats of *Acorus calamus* in Hungary.)** [Russian and German summaries ½ p. each.]
Kísérl. Közlem., Sect. C, 1960, **53C**(1): 93-103, bibl. 17, illus.

Sweet flag is used for medicinal purposes and provides an essential oil. Propagation by rhizomes is simple, and a study of its present habitats suggests that its cultivation could be extended.

6575. KEREKES, J.
Összehasonlító szakaszosvetési vizsgálatok a kamillával. **(Comparative sowing trials with chamomile.)**
Magy. Tud. Akad. Agrártud. Oszt. Közlem., 1959. **16**(3-4): 430-42. from *Hung. agric. Rev.*, 1960, **9**, Abstr. 254.

For chamomile medium to heavy, weed-free soils were found suitable and an average monthly rainfall of 30-40 mm., particularly in the spring and autumn, proved necessary. In the spring the response to moisture was sufficient to make irrigation during dry periods economic. The preferred sowing period was 10 September to 10 October, which ensured adequate growth without the risk of frost damage. In a wet summer sowing in July produced flowering plants by September.

6576. HAVELKA, B.
Vliv hnojení na růst merlíku vonného *Chenopodium ambrosioides* L. var. *anthelminth.* Gray. **(The effect of fertilizers on the growth of *C. ambrosioides* var. *anthelminthicum*.)** [Russian and German summaries ⅓ p. each.]
Sborn. vys. Šk. zeměd. v Brně, Řada A, 1960, No. 3-4, pp. 293-7, bibl. 2.

N alone or in combination with P or K had the greatest effect on the growth and yield of chenopodium. Flowering was most profuse with PK, NP and NPK. The essential oil content of the leaves was highest with P, PK and NPK, and the colour of the oil was most favourably affected by K, PK and NPK, which resulted in an orange coloured oil instead of the yellow oil produced by other combinations.

6577. BISHT, B. S., AND NAYAR, S. L.
Pharmacognosy of root and leaf of *Coccinia indica* Wight and Arn.
J. sci. industr. Res., India, Sect. C, 1958, **17C**: 46-51, bibl. 6, illus.

Macroscopic and microscopic characters described.

6578. LESKOVA, E. S.
Germination of seeds of *Cochlearia arctica*. [Russian.]
Agrobiologija, 1961, No. 1, pp. 135-6.

C. arctica is used in folk medicine as an antiscorbutic remedy. The optimum temperature range for its germination was found to be 15–20° C., at which temperature maximum emergence occurred on the second day. Germination was satisfactory at temperatures above 8° C., but decreased again above 20° C. Under less favourable conditions maximum emergence occurred on the third day.

6579. LEETE, E., AND NÉMETH, P. E.
The biogenesis of the alkaloids of *Colchicum*. II. Tracer studies with acetate-1-C^{14} and methionine-methyl-C^{14}.
J. Amer. chem. Soc., 1961, **83**: 2192-4, bibl. 7.

The administration of labelled sodium acetate to *C. byzantinum* corms led to the formation of radioactive colchicine which was labelled on the N-acetyl group. Demecolcine isolated from the plants was essentially inactive. When methionine-methyl-C^{14} was administered radioactive colchicine and demecolcine labelled on their O- and N-methyl groups were obtained. [From authors' abstract. For part I, see *H.A.*, 31: 2778.]—Univ. Minn., Minneapolis.

6580. Liss, I.
Über das Vorkommen von 3,4-Dioxyphenylalanin im Latex von *Euphorbia lathyris* L. **(On the presence of 3,4-dioxyphenylalanine in the latex of *Euphorbia lathyris*.)**
Naturwissenschaften, 1961, **48**: 304-5, bibl. 5.

DOPA, otherwise found only in legumes, is present in large quantities (26·4% of total N) in the latex, but occurs only in traces in other tissues.

6581. Knott, R. P.
A phytochemical analysis of *Galium triflorum*.
Diss. Abstr., 1961, **21**: 2906, being *L.C. Card No. Mic.* 61-960 of 91 pp.

Pharmacological studies indicated that aqueous extracts of the dried plant produced a fall in the blood pressure of dogs. Further tests indicated that asperuloside, isolated from the extract, was not the constituent mainly responsible for the fall in blood pressure.—Ore. St. Coll.

6582. Leskova, E. S.
Problems in the cultivation of *Inula helenium*. [Russian.]
Agrobiologija, 1960, No. 5, pp. 764-5.

Seeds of *Inula helenium* are extremely light, 1,000 weighing only 1·0–1·5 g., but 93% germination was obtained on filter paper. Under field conditions the best stand was obtained following the sowing of dry seeds in October. Sowing dry seeds in May was not successful, but stratification for 1 month effected some improvement. The highest yields of roots and rhizomes were also obtained after autumn sowing.

6583. Carew, D. P., and Chin, T. F.
Constituents of *Lagerstroemia flos-reginae* Retz.
Nature, 1961, **190**: 1108-9, bibl. 11.

A drug prepared from the leaves of this tree is commonly used in the Philippines to lower the blood sugar content. The hypoglycaemic properties of the leaf extract are attributed to certain amino acids which were found to be present. Tannins were also present, but not alkaloids, glycosides, sterols or flavonols.—St. Univ. Iowa.

6584. Olney, H. O.
Growth and translocation during the after-ripening of seeds with resting embryos.
Diss. Abstr., 1961, **21**: 2449, being *L.C. Card No. Mic.* 60-5368 of 96 pp.

For the work reported on *Prunus cerasus* seeds, see *H.A.*, 30: 171 and abstract 5820 in this number. Embryos of *Lindera benzoin* showed an initial burst of cell division during after-ripening at both 5° and 25° C., but there was no further increase in cell number or length. There was a slight increase in high-energy nucleotide P during after-ripening at 5° C., but no other significant changes were noted. —Univ. Del., Newark.

6585. Miram, R., and Pfeifer, S.
The changes of the alkaloid content of the poppy plant (*Papaver somniferum*) during the period of vegetation.
Sci. Pharm. Aceut., 1960, **28**: 15-28, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 71,883.

In a cultivar of the ssp. *eurasiaticum* var. *coerulescens* narcotoline [see *H.A.*, 30: 2493] and narcotine were completely absent from all the plant organs during the whole of the vegetative period.

6586. Pfeifer, S., and Heydenreich, K.
Der Gehalt des Mohnmilchsaftes an Narcotolin. **(The narcotoline content of opium poppy latex.)**
Naturwissenschaften, 1961, **48**: 431-2, bibl. 6.

Narcotoline contents of fresh latex from the capsules of 3 varieties were 1·59%, 2·45% and 2·56% respectively. When the latex was dried in ordinary air for 24 hours, the narcotoline contents were somewhat lower. Further reductions of the narcotoline contents during 6 months' storage were slight.—Pharm. Inst., Humboldt-Univ., Berlin.

6587. Leskova, E. S.
On the biology of *Peucedanum* spp., sources of a new anti-tumour substance. [Russian.]
Bot. Žurnal, 1960, **45**: 1360-2, bibl. 2.

Peucedanum ruthenicum and *P. morisonii* are sources of peucedanine (4-methoxy-5-isopropyl-furo-2,3,6,7-coumarin) used in anti-tumour therapy. Cultivation trials have shown that both species can be propagated by seed, either stratified for 4 months or sown in the autumn. *P. morisonii* gave higher yields of roots containing more of the active principle.

6588. Tsao, D. P. N., and others.
A note on the biological activity of root extracts from *Pleiocarpa mutica* Benth.(Apocynaceae).
Econ. Bot., 1961, **15**: 99-103, bibl. 3, illus.

Aqueous and ethyl acetate extracts had hypotensive activity; the latter also destroyed adult and larval stages of the nematode *Panagrellus redivivus*. —Univ. Rhode Is., Kingston.

6589. Kohlmünzer, S., and Dihnal, B.
Zawartość garbników w kłączu pięciornika w zależności od warunkow zbioru surowca. **(The tannin content of potentilla roots in relation to the time of harvest.)**
Przem. Spoż., 1958, No. 10-12, pp. 420-2, from *Polish tech. Abstr.*, 1959, No. 34, Abstr. 5978.

Roots (Rhizoma Tormentillae) collected from potentilla plants during the development of aerial organs in late spring contained the highest percentage of tannins. Storage for more than 2 years caused gradual oxidation and loss of tannins.

6590. Mestenhauser, A.
Die Inkulturnahme der *Primula veris* L. Wechselbeziehungen zwischen Saponin- und Stärkegehalt in der Wurzel. **(The correlation between saponin and starch contents in the roots of cultivated primroses.)**
Pharmazie, 1961, **16**: 45-9, bibl. 19, illus.

By cultivating primroses the yield of the drug Radix Primulae, which can replace senega root, can be increased. Trials and analyses have shown that *Primula veris* var. *macrocalyx* gives the highest yield and is easily propagated. The saponin content is at a maximum at the beginning of the growing period when starch is at a minimum. Analyses throughout the year showed the saponin and starch contents to be inversely related.—Czech. Acad. agric. Sci., Prague.

6591. Chandra, V.
Studies in *Psoralea coryfolia* L.
J. sci. industr. Res., India, Sect. C, 1958, **17C**: 148-53, bibl. 6, illus.

Morphological features and cultivation methods are described. The seed oil has medicinal properties.

6592. Call, T. G., and Fischer, E. B.
Extractive studies of the roots of *Pteryxia terebinthina* var. *terebinthina* and the isolation of pteryxin.
Econ. Bot., 1961, **15**: 104-6, bibl. 5.

Pharmacological activity and chemical data.

6593. Zoz, I. G.
Reserpine-containing species of *Rauwolfia*. [Russian.]
Bot. Žurnal, 1960, **45**: 1219-26, bibl. 25, illus.

Descriptions and synonyms of the 3 main sources, viz. *R. serpentina*, *R. canescens* and *R. vomitoria*, and mention of some lesser known species.

6594. Chatterjee, A., and others.
Alkaloids of *Rhazya stricta* Decaisne.
Chem. Ind., Lond., 1961, No. 27, pp. 1034-5, bibl. 4.

R. stricta is a small shrub, the leaves of which are used in N.W. India as a bitter tonic for fevers and general debility. The drug contains 8–10% of alkaloids, of which 4 have been isolated. Chemical details are given here of one alkaloid that appears identical to quebrachamine, and of another that appears to be new and has been named rhazine.—Univ. Coll. Sci., Calcutta-9.

6595. McPhail, A. T., and others.
Alkaloids of calabash curare: the structure of macusine-A.
Proc. chem. Soc., Lond., June 1961, pp. 223-4, bibl. 7, illus.

6596. Gupta, B., and Bal, S. N.
Pharmacognostic studies of Indian viburnums.
J. sci. industr. Res., India, Sect. C, 1958, **17C**: 67-71, bibl. 5. illus.

The external and internal morphological characters of the stem and root barks of *V. coriaceum* and *V. foetidum* and of 2 spurious viburnums are described. The bark of the two true virburnums yielded fractions which exhibited uterine antispasmodic effects similar to those American virburnums.

6597. Panov, P., and others.
On the alkaloids of *Vinca herbacea* W.K.1. [Russian, with German summary 6 lines.]
Mollov, N., and others.
Idem. II. Herbacein, a new alkaloid in the genus *Vinca*. [Russian, with German summary 5 lines.]
C.R. Acad. bulg. Sci., 1961, **14**: 39-41, bibl. 3, and 43-6, bibl. 1.

The aerial part of *V. herbacea* was found to contain 0·5% of total alkaloids, which, in addition to the expected hypotensive effect, seemed to have an effect similar to that of curare. From the ether extract of the total alkaloids an indole derivative, $C_{24}H_{32}N_2O_6$, was isolated and named herbacein.

6598. Trojánek, J., and others.
Vincaminine and vincinine, two new alkaloids of *Vinca minor* L.
Chem. Ind., Lond., 1961, No. 23, p. 790, bibl. 9.

Details of separation and spectral characteristics.

6599. Woodbury, A. M., Wall, M. E., and Williaman, J. J.
Steroidal sapogenins. LVIII. Steroidal sapogenins from the Joshua tree.
Econ. Bot., 1961, **15**: 79-86, bibl. 15, illus.

The distribution and seasonal variation, chemical structure and uses of sapogenins from *Yucca brevifolia*; the seeds are rich in hecogenin and tigogenin.

Essential oils.

(*See also* 5618, 6576, 6627, 6635, 6791, 6799, 6923, 7105.)

6600. Iacobashwili, J.
Volatile oils in the U.S.S.R.: their production and composition.
Perfum. essent. Oil Rec., 1961, **52**: 226-32.

Details of extraction are given briefly for numerous essential oil bearing plants, including some little known species.

6601. Yeh, P.-H.
Decolorisation of Taiwan peppermint oil, orange oil and the flower oil of *Citrus grandis*.
Perfum. essent. Oil Rec., 1961, **52**: 86-8, bibl. 8.

Activated charcoal and hydrogen peroxide were the most effective decolorizers for essential oils from the fruits of *Citrus tankan*, and the flowers of *C. grandis* and *Mentha arvensis*.—Provincial ind. Res. Inst., Taipei, Taiwan,

6602. Tucakov, J.
Phytoncide properties of essential oils—antibiotics in superior plants.
Perfum. essent. Oil Rec., 1961, **52**: 79-85, bibl. 11.

The antibiotic properties of essential oils from numerous species are reviewed, and it is noted that these properties are at a maximum during flowering.

6603. Naves, Y.-R.
The essential oils of gingergrass (*Cymbopogon martini* Stapf, var. *sofia*) and *Cymbopogon densiflorus* Stapf.
Perfum. essent. Oil Rec., 1960, **51**: 242-5, bibl. 10.

By using distillation, vapour-phase partition chromatography and infra-red spectrometry these oils were found to contain 4 menthadiene alcohols of which perillic alcohol was one. The biogenesis of these compounds is discussed.—L. Givaudan et Cie, Vernier-Geneva, Switzerland.

6604. Gleisberg, W., and Hartrott, R.
Die Reifungsvorgänge in der Fenchelfrucht. Ein Beitrag zu der Frage der Veränderung des Gehaltes an ätherischem Öl in der Frucht vor und nach der Ernte. **(The ripening processes in the fruit of fennel. A contribution to the problem of the changes in the content of essential oil in the fruit before and after harvest.)** [English and French summaries ½ p. each.]
Gartenbauwiss., 1960, **25**: 183-230, bibl. 7.

The onset of ripening is characterized by a decrease in the weight of seeds (in lots of 1,000), which had hitherto been increasing, and is accompanied by increased contents of dry matter, protein, and volatile and fatty oils, and by a fall in the levels of K and P_2O_5. Full ripeness is reached when no further diminution in seed weight takes place, and the crop should be harvested before or at this stage, because after it has passed the volatile oil content tends to decline. The possible improvement of fennel by breeding and the results of some manurial experiments are also discussed.

6605. Pussard, R.
Aspects des dégâts de la cécidomyie des lavandes. **(Types of injury caused by the lavender cecidomyid.)**
C.R. Acad. Agric. Fr., 1960, **46**: 995-8, bibl. 5.

Thomasiniana lavandulae.

6606. Choudhury, J. K., and Bose, R. B.
Essential oil from *Lippia geminata* H.B. & K.
Sci. and Cult., 1961, **27**: 101, bibl. 7.

The yield of oil (0·256 to 0·327% of dry leaves) and its properties.

6607. Korneva, E. I.
Biological characteristics of the formation and growth of rhizomes of peppermint. [Russian.]
Agrobiologija, 1960, No. 5, pp. 763-4.

During periods of high temperature growth of peppermint rhizomes takes place at the expense of stem growth. Maximal growth of rhizomes occurred in August after removal of the crop. Subsequently growth gradually declined and ceased altogether when temperatures fell to 2–3° C.

6608. Kerekes, J.
A borsosmenta (*Mentha piperita*) vízforgalma. **(Water relations in peppermint.)**
Magy. Tud. Akad. Agrártud. Oszt. Közlem., 1960, **17**(1): 105-16, from *Hung. agric. Rev.*, 1960, **9**, Abstr. 289.

In pot experiments the transpiration coefficient of peppermint plants in a peat (organic) soil differed from that in an alluvial soil. It ranged from 312 to 342 in both soil types. The rate of transpiration depended more on the development and size of the leaves than on the temperature or relative humidity of the air. Maximum water consumption occurred prior to full bloom, at which time irrigation is considered to be advisable. Root yields were higher on alluvial than on peat soils, stem yields were about equal, but leaf yields were higher on peat soils.

6609. Krys'kov, E. I., and Škurat, D. F.
The reaction of mint (*Mentha piperita*) to gibberellin. [Russian.]
Bot. Žurnal, 1961, **46**: 707-10, illus.

GA at 0·0001% and 0·01% was applied to peppermint in the laboratory by the drop method and out of doors by spraying. The treated plants grew much better than the controls but had less dense foliage and a lower essential oil content. At 0·01% GA increased the quantity, and improved the viability, of seeds, which is of great interest for breeding.

6610. Admiral'skaja, S. A.
The flower biology and hybridization of fertile forms of *Mentha piperita*. [Russian.]
Bot. Žurnal, 1961, **46**: 690-5, bibl. 3, illus.

Artificial pollination of 3–5-day-old flowers of allopolyploid plants resulted in the highest percentage of seed set.

6611. FARKAS, G. L., MOLNÁR, G., AND KIRÁLY, Z.
Control of the mint rust fungus, *Puccinia menthae*, by nickel salts.
Phytopathology, 1960, **50**: 866, bibl. 3.
See *H.A.*, 31: 989.

6612. SMITH, D. M., AND LEVI, L.
Treatment of compositional data for the characterization of essential oils. Determination of geographical origins of peppermint oils by gas chromatographic analysis.
J. agric. Food Chem., 1961, **9**: 230-44, bibl. 52.
Compositional data for *Mentha piperita* and *M. arvensis* oils obtained by this method can be used for determining the geographical origins of peppermint oils, recognizing the biochemical relationships governing the formation of oil in the plant, evaluating manufacturing processes and detecting adulterants.—Dep. nat. Health Welfare, Ottawa.

6613. RIKOVSKI, I., AND HADŽIJEV, D.
Determination of menthone in peppermint oil by means of menthone-2,4-dinitrophenylhydrazone. [Yugoslav, with English summary 1 p.]
Letopis nauč. Rad., Novi Sad, 1958, **2**: 155-9, bibl. 7.
Description of a rapid (3-4 hr.) and accurate method.

6614. SHIMIZU, S., UEDA, H., AND IKEDA, N.
(+)-Neoiso-isopulegol, a new stereoisomer of isopulegol, and piperitenone from a variety of *Mentha rotundifolia*.
Perfum. essent. Oil Rec., 1960, **51**: 657-60, bibl. 26.
In a strain obtained from France, which, unlike 5 other strains, did not contain piperitenone-oxide.

6615. NIGAM, S. S., AND PUROHIT, R. M.
Chemical examination of the essential oil derived from the leaves of *Murraya koenigii* (Linn) Spreng (Indian curry leaf).
Perfum. essent. Oil Rec., 1961, **52**: 152-5, bibl. 9, illus.
The oil obtained by water distillation consisted mainly of *l*-α-pinene, *l*-sabinene and dipentene, with lesser quantities of sesquiterpenes.—Univ. Saugar, Sagor, M.P., India.

6616. YEH, P.-H.
The essential oil of *Ocimum gratissimum* var. *suavis* Hook.
Perfum. essent. Oil Rec., 1960, **51**: 611-12, bibl. 9.
By fractionation the main constituent was found to be eugenol (62%), ocimene and *l*-cadinene being also present as well as *l*-perillyl alcohol.—Provincial ind. Res. Inst., Taipei, Taiwan.

6617. YOSHIDA, T., AND TAMAI, T.
Physiological and ecological studies on the secretory function of essential oil in *Pelargonium* species. I. The relation between the distribution of oil glands and the percentage yield of essential oil. [Japanese, with English summary.]
Jap. J. Breed., 1958, **7**: 235-40, illus., from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 71,897.
The differentiation, structure and distribution of the glands were investigated in *Pelargonium denticulatum*, *P. roseum* and *P. radula*. The number of glands per unit area was greatest in the lower epidermis and in the uppermost leaves. The yield of essential oil from any plant part was correlated with the number of glands present. [For parts VII and VIII see *H.A.*, 31: 994.]—Ehime Univ.

6618. KULKARNI, G. H., AND OTHERS.
Examination of costus root oil, part II.
Perfum. essent. Oil Rec., 1961, **52**: 20-4, bibl. 7.
Identification of the constituents of the "benzene fraction L" and "ether fraction M" in oil from roots of *Saussurea lappa*.

6619. NIGAM, I. C., AND DHINGRA, D. R.
Essential oil from the leaves of *Zanthoxylum alatum* (Roxb.).
Perfum. essent. Oil Rec., 1960, **51**: 246-8, bibl. 7.
The main component proved to be methyl nonyl ketone; linalool, linalyl acetate and unidentified sesquiterpenes were also isolated.—H.B. Technol. Inst., Kanpur.

Fibres.

(*See also* 6961, 6964.)

6620. NAZIF, S.
Fibre crops in Egypt.
[*Publ.*] *Minist. Agric., Egypt*, 1958, pp. 20 (English), 25 (Arabic), bibl. 1, 35 Mills.
Including details of the history, varieties and culture of ramie.

6621. JAKOBEY, I.
A kender felületének és rosttartalmának összefüggése. Az élő és még lábon álló kender objektív értékelése. **(Correlation between the surface area and fibre content in hemp. Objective evaluation of standing uncut hemp.)**
Kísérl. Közlem., 1959, **52**/A(3): 15-21, from *Hung. agric. Rev.*, 1960, **9**, Abstr. 379.
A high positive correlation (0·80) was found between the surface area of the stalk and the fibre content in both male and female hemp plants at the Szeged Agricultural Research Institute. The surface area measurement can be made rapidly in the field on standing hemp before flowering and facilitates the selection of promising breeding material.

6622. Zemljanuhin, A. A., and Šenšina, S. V.

Studies on sex expression and its reversal in hemp. [Russian, with English summary ¼ p.]

Fiziol. Rast., 1961, **8**: 213-19, bibl. 21.

In staminate hemp plants, during the flowering stage, the respiration rate, organic phosphate and sucrose contents and ascorbinoxidase activity were higher than in pistillate plants, whereas in the latter the total P and ascorbic acid contents and the reducing capacity were higher. Pre-sowing seed treatments with ascorbic, succinic and aspartic acids and cystine increased the pistillate characteristics, while X-ray treatment tended to intensify the staminate features, but CO had no effect on sex expression.

6623. Bócsa, I.

Előzetes jelentés a hímmentes [uniszexuális] kenderalak előállításáról. **(Preliminary report on the production of male-free (unisexual) hemp.)**

Kísérl. Közlem., 1959, **52**/A(3): 135-42, from *Hung. agric. Rev.*, 1960, **9**, Abstr. 380.

Kísérleti adatok az uniszexuális F_1-hibrid-kender magtermőképességéről. **(Data on the seed yielding capacity of the unisexual F_1 hybrid hemp.)** [English, German and Russian summaries ¾ p. each.]

Növénytermelés, 1961, **10**: 43-50, bibl. 4.

On crossing a special monoecious hybrid bred by the author with various dioecious strains F_1 hybrids were obtained with 93·4% unisexual plants, of which 60·7% were pure females and 30·7% monoecious. The maximum percentage of unisexual plants produced was 97·8. The hybrids yielded 70·5% more seeds than the dioecious mother strain. This was due entirely to the increase in functionary female flowers, since the yielding capacity and seed weight of the individual hybrid plants were lower than in the parent.

6624. Ferri, F.

Le avversità delle piante viste alla lente. Canapa. **(Plant pests and diseases seen under a lens. Hemp.)**

Progr. agric., Bologna, 1961, **7**: 764-5, illus.

Notes are provided on the control of the moth *Pyrausta nubilalis* by destroying material containing hibernating larvae, and by spraying with chlorinated compounds or phosphoric esters; *Macrophomina phaseolina* by soil disinfection; and *Ditylenchus dipsaci* by soil treatment with nematicides. Several other pests and diseases are described briefly.

6625. Stanković, L.

New methods for the mechanical extraction of fibres from hemp stalks. [Yugoslav, with English summary 1 p.]

Letopis nauč. Rad., Novi Sad, 1959, **3**: 156-61, bibl. 3, illus.

One new type of decorticating machine, SC-32, increased the ratio between the extracted long and short fibres to 73:27% and another, Decorti, to 74·5:25·5% compared with the 60:40% ratio obtained with standard types of machine. The arrangement of the crushing rollers is shown diagramatically.

Gums and resins.

6626. Ghosh, S. S.

Histological responses in the secondary xylem of *Shorea robusta* Gaertn. due to tapping.

J. sci. industr. Res., India, Sect. C, 1958, **17C**: 100-3, bibl. 12, illus.

An analysis of anatomical data indicated that the reaction to tapping wounds varied from tree to tree. Some trees quickly formed tyloses which block the vessels completely, but others appear to resist such blocking.

6627. Paknikar, S. K., and Bhattacharyya, S. C.

Investigation on the resin oil from *Shorea robusta*.

Perfum. essent. Oil Rec., 1961, **52**: 233-7, bibl. 9.

About 68% of chua oil is obtained by the dry distillation of *S. robusta* resin. The oil proved to be a complex mixture requiring careful fractionation and elaborate column chromatography for separation and identification.—Nat. chem. Lab., Poona.

Hops.

6628. Nečiporčuk, I. D., and Pošpur, A. A.

The use of qualitatively different hop plant tissues in the formation of hop gardens. [Russian.]

Agrobiologija, 1960, No. 5, pp. 761-3.

An experiment comparing hard and moderate pruning on 2 dates (9 and 24 April) is reported. The yield was recorded for individual shoots, which were classified as well or poorly developed and as having emerged from 1- or 2-year-old tissue. In one garden, which had cropped relatively heavily for the preceding 2 years, the later pruning resulted in a greater proportion of well developed shoots, and the highest yields were recorded on the shoots arising from 1-year tissue. In another garden, which had had a smaller crop in the preceding year, the earlier pruning resulted in the greater percentage of well developed shoots, and shoots from 2-year tissue yielded best.

6629. Stevens, R., Roberts, J. B., and Williams, I. H.

Treatment of hops (*Humulus lupulus*, L.) with gibberellic acid. Effect of spraying with gibberellic acid on yield and composition.

WILLIAMS, I. H.
Idem. Effect on growth and development.
Nature, 1961, **191**: 360-1, bibl. 3, and 361-2, bibl. 5, illus.

The first article deals with the effect of spraying 2-year-old plants of the variety Bullion with a solution containing 12·5 p.p.m. of the K salt of GA on 19 July, 1960, when most of the stigmas were about ⅛ in. long. Within 1 week of treatment newly developed leaves were noticeably paler green and the laterals were longer with more extended internodes than in the control plants. Fifteen days after spraying the dry weight per 100 cones of the treated hops was 4·32 g. compared with 1·40 g. for the controls. By 17 August the visual difference between the cones of treated and control plants had largely disappeared. Essential oils continued to be synthesized until harvest. At harvest the control plants yielded 3·25 lb. of green hops per bine, whereas the treated hops only gave 2·59 lb. Both groups contained the same percentage of dry matter, soft resin and α-acid. The second article records the effects of GA on shoot growth and leaf form. Vernalized seedlings were grown in a cool glasshouse, and treatment with GA at 1, 5 and 10 p.p.m. began immediately after the cotyledons had expanded, and was repeated at 5-day intervals using a hand spray. The treated seedlings elongated more rapidly initially, and the first 2 or 3 internodes were considerably longer than those of the controls. Thereafter the maximum internode length of the treated plants did not exceed 14 cm., whereas the control plants developed successively longer internodes, which reached a maximum length of 26 cm. when the experiment ended. The rate of stem elongation declined in the treated plants, so that their mean height was significantly less than that of the untreated plants. The number of nodes developed by the treated plants was, however, a third greater than the controls. In the treated plants the leaves remained entire, had a larger total area and were chlorotic.—Brew. Ind. Res. Found., Nutfield, Surrey, and Wye Coll., Ashford, Kent.

6630. COLEY-SMITH, J. R.
Hop diseases and the brewer.
J. Inst. Brew., 1961, **67**: 231-5, bibl. 3.

The development of resistant strains to reduce the damage caused in hop gardens by *Verticillium* wilt and downy mildew is discussed. The variety preferred by brewers, Fuggle, while extremely resistant to *Pseudoperonospora humuli*, is very susceptible to the more dangerous pathogen *Verticillium albo-atrum*. The use of copper and organic fungicides for mildew control is liable to cause contamination of the cone. The virus diseases nettlehead and mosaic are also mentioned, and it is noted that the vectors are as yet unknown.—Dep. Hop. Res., Wye College.

6631. SKOTLAND, C. B.
Infection of hop crowns and roots by *Pseudoperonospora humuli* and its relation to crown and root rot and overwintering of the pathogen.
Phytopathology, 1961, **51**: 241-4, bibl. 10, illus.

Hop downy mildew systemically infected all subterranean portions of the hop plant. Many of the infected crowns died but others lived for a number of years. Mildew symptoms on the belowground parts include a reddish-brown discolouration and a brown necrotic spotting in the parenchyma tissue. These symptoms are often accompanied by a black rot assumed to be due to secondary organisms. The mildew overwinters in the crown and invades new shoots, causing the development of basal spikes on which the mildew sporulates. Secondary spread occurs from these shoots by means of sporangia. When shoots become infected, the fungus spreads systemically into the crown, completing the life cycle. Oospores, found only once, are considered unimportant in the life history of the hop downy mildew fungus in the Yakima Valley in Washington. [From author's summary.]—Irrig. Exp. Stat., Prosser, Wash.

6632. BORN, M., JENSKE, A., AND ERMICH, E. F.
Vergleichende Untersuchungen über die Anwendungsmöglichkeiten verschiedener Arbeitsverfahren zur Schädlingsbekämpfung im Hopfenbau. (**Comparative studies on the applicability of various techniques to pest control in hops.**) [Russian and English summaries 18 lines each.]
NachrBl. dtsch. PflSchDienst, Berlin, 1960, **14**: 253-8, bibl. 3, illus.

Trials were made of low and high volume automatic spraying and of hand spraying. With hand spraying drift and waste of material were relatively high, and 13 hours and 3 men were required per hectare. Carefully applied hand spraying had an aphid-reducing effect barely equal to that of automatic high volume spraying carried out between all the rows. The various types of machine tested are described and comparative data given. High volume automatic spraying is recommended, since a satisfactory apparatus for low volume application to hops is not available.—Biol. ZentrAnst. dtsch. Akad. LandwirtschWiss., Berlin.

6633. WRIGHT, D., AND HOWARD, G. A.
Biosynthesis of the hop resins.
J. Inst. Brew., 1961, **67**: 236-40, bibl. 18.

By injecting sodium acetate, with labelled carbon in the carboxyl group, into hop bines and examining the resultant bitter principles, it was revealed that humulone was formed by the head-to-tail condensation of acetate units, and that both humulone and lupulone had a common precursor, desoxyhumulone.—Brewing Ind. Res. Found., Nutfield, Surrey.

6634. Verzele, M.
Critical examination of methods of analysing hops.
Pet. J. Brasseur, 1961, pp. 119-22, from abstr. in *J. Inst. Brew.*, 1961, **67**: 277.

The polarimetric determination of α-acids in the ether eluate of a ground hops and activated carbon column is considered the most satisfactory rapid method.

6635. Bausch, H., Rothenbach, E., and Wolter, H.
Determination of the essential oil content of the hop cone. [German?]
Nahrung, 1960, **4**: 599-618, from abstrs in *J. Inst. Brew.*, 1961, **67**: 203, and *J. Sci. Food Agric.*, 1961, **12**: i-290.

By steam distillation, absorption in pentane and evaporation of the solvent in nitrogen under reduced pressure.

Insecticidal plants.

(*See also* 6588, 6964, 7235, 7270, 7289, 7292.)

6636. Crowley, M. P., and others.
Biosynthesis of the pyrethrins.
Nature, 1961, **191**: 281-2, bibl. 12.

In pyrethrum pyrethrins are synthesized as well as stored in the achenes. Unfertilized ovules incorporated more mevalonic acid into pyrethrins than fertilized ovules.—Trop. Prod. Inst., London.

Rubber plants.

(*See aslo* 6580.)

6637. Veihmeyer, F. J., and Hendrickson, A. H.
Responses of a plant to soil-moisture changes as shown by guayule.
Hilgardia, 1961, **30**: 621-37, bibl. 14, illus.

In a 3-year trial at Davis, California, plants that were unirrigated during the last 2 years of the experiment, and received water only from winter rains, produced the most rubber. All treatments increased in rubber content between the October and April samplings. The percentage of rubber was higher at the end of the experiment than at the end of the second year. The growth of plants in the field under high soil-moisture conditions was not greater than that in treatments in which the soil moisture was reduced to about the permanent wilting percentage (PWP) before irrigation. Neither the use of water by the plants in tanks nor their growth was increased at high moisture levels over those in treatments which allowed the soil moisture to drop almost to the PWP. The slopes of the water-extraction curves by guayule plants in tanks, the regression lines of water use, and the difference in evaporation between black and white atmometers show that water is equally available for transpiration between the field capacity and PWP. [From authors' summary.]

6638. Moiseeva, V. P.
The productivity of forms of kok-saghyz flowering and not flowering during their first year of growth. [Russian.]
Bot. Žurnal, 1960, **45**: 1175-8, bibl. 10.

Kok-saghyz plants which flowered during their first season produced roots of lighter weight and lower rubber content and lighter seeds and showed a higher incidence of bacteriosis than plants which flowered in their second season. Flowering in June of the first year was more detrimental than flowering in July of the same year.

Seed oils.

(*See also* 5704, 6604, 6811, 6961, 7268, 7289.)

6639. Nordestgård, A.
Forsøg med stigende mængder kalksalpeter til dodder. (**Increasing applications of nitrate of lime to *Camelina sativa*.**) [English summary ½ p.]
Tidsskr. Planteavl, 1961, **64**: 1024-34.

Seed yields of *Camelina sativa* increased with applications of nitrate of lime up to the highest level applied (900 kg./ha.), although the yield increments became smaller with successive increases in fertilizer level. A rate of 600–700 kg./ha. is recommended as the most economic level. In a loamy soil plant growth was satisfactory at pH 6·0, 6·5 and 7·0, but development and yield were poor at pH 4·8. Preliminary experiments show that harvesting should be early rather than late, and the crop can be cut when the first siliquas are brown, containing fully-ripe seed.—St. Forsøgstat., Aarslev.

6640. Brzeski, W., and Reifer, I.
Próba zastosowania zelazicyjanku jako stymulatora w uprawie racznika. (**An attempt to use ferricyanide as a stimulant in the cultivation of the castor bean.** [English summary.]
Acta Soc. bot. Poloniae, 1959, **28**: 653-64, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 71,726.

When ferricyanide was applied to seeds prior to sowing, it had an adverse effect on germination and shoot emergence, but the effect was confined to early growth stages and disappeared later. Ferricyanide had no effect upon yields, which were closely related to the time of sowing and the temperatures during the growth cycle, and it had no effect upon the weight, fat content, lipase activity, total N, saponification and acid indices of the beans. Beans from plants grown in ferricyanide-treated soil showed a higher unsaturated fat content.—Coll. Agric., Warsaw.

6641. SATO, I.
Histological studies on the georeaction shown in the xylem of the main axis of *Ricinus communis* L.
J. exp. Bot., 1961, **12**: 341-51, bibl. 15, illus.

6642. SHIFRISS, O.
Gibberellin as sex regulator in *Ricinus communis*.
Science, 1961, **133**: 2061-2, bibl. 7.

Spraying monoecious inbreds with gibberellin A_3 can markedly increase their female tendency. The effect of this substance upon sex appears to simulate the action of long days.—[Author's abstract.]—Rutgers Univ., New Brunswick, N.J.

6643. CANVIN, D. T., AND BEEVERS, H.
Sucrose synthesis from acetate in the germinating castor bean: kinetics and pathway.
J. biol. Chem., 1961, **236**: 988-95, bibl. 39.

The uptake and distribution of variously labelled acetate, succinate and malate by slices of endosperm are described. The results showed that most of the acetate was converted to sucrose by way of dicarboxylic acids produced in the glyoxylate cycle. —Purdue Univ., Lafayette, Ind.

6644. WALLER, G. R., AND HENDERSON, L. M.
Biosynthesis of the pyridine ring of ricinine.
J. biol. Chem., 1961, **236**: 1186-91, bibl. 29.

Uptake studies of variously labelled nicotinic acid and nicotinamide indicated that the pyridine ring and the amide group are incorporated as a unit into ricinine. In further studies on the biosynthesis of the pyridine ring 3 possible precursors, viz. glycine, DL-glutamic acid and sodium formate, warrant further investigation.—Okla. St. Univ., Stillwater.

6645. BRZESKI, W.
Wpływ pory dojrzewania nasion racznika na wydajność, stopień wykształcenia i zawartość tłuszczu. **(Time of ripening of the castor bean and its influence upon the yield, physical characteristics and fat content.)** [English summary.]
Acta Soc. bot. Poloniae, 1959, **28**: 665-75, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 71,727.

The highest yields were obtained from the first cluster, successive clusters maturing later producing progressively lower yields. Beans from the first cluster were longer, and those from the second and third were proportionately broader, but their breadth was the same in all cases. The weight and fat content both decreased with the time of maturation. There were no differences in saponification, iodine or acid indices between the seeds from different clusters.—Coll. Agric., Warsaw.

6646. RAYMOND, W. D.
Castor beans as food and fodder.
Trop. Sci., 1961, **3**: 19-24, bibl. 7, illus.

Analyses of castor seed cake are given and attempts to render it suitable for human and animal consumption by de-toxification are described.

6647. PONTOVIČ, V. É.
Placenta and seed culture under sterile conditions as a method for studying the metabolism of developing fruits. [Russian, with English summary $\frac{1}{3}$ p.]
Izv. Akad. Nauk SSSR, Ser. biol., 1961, No. 2, pp. 233-8, bibl. 9, illus.

Ovules of the oil poppy were unable to develop on an agar culture medium containing various physiologically active compounds, unless they were still attached to the placenta; attached ovules synthesized oil normally and germinated in the culture medium as soon as they were ripe. Experiments with C^{14}-glucose showed that the placenta utilized glucose from the medium in the formation of amino acids and also in the synthesis of oil.

6648. CLEIJ, G.
Beet yellows in poppy. [Dutch summary 10 lines.]
Euphytica, 1961, **10**: 225-8, bibl. 5, illus.

Poppy appears to be susceptible to the virus yellows of beet. In glasshouse trials the seed production of poppy became a complete failure on account of early infection with the virus. A similar infection in a field trial resulted in a yield reduction of 22% and a clear deterioration of the commercial quality. Because of a retarded transmission of the virus by aphids there is no need for breeding for resistance to the virus in poppy. Treatment of the crop with systemic insecticides at the right moment can largely obviate the damage. [From author's abstract.]—Pl. Breed. Foundation, Wageningen.

6649. DUMONT, G.
La récolte de l'oeillette. **(Harvesting poppy heads.)**
Oléagineux, 1961, **16**: 365-8, illus.

Hand harvesting of oilseed poppies gives the best results, but demands about 110 man-hours per ha. In this case the capsules are afterwards broken open in a root chopper and the seeds removed by winnowing. In damp seasons the plants are cut and baled mechanically, and threshed after drying in the field. In dry seasons a combine harvester is normally used, and in this case a separating machine can be attached for collecting the seeds and broken capsules separately. Various machines for cleaning the capsule portions and the seeds are briefly described.

6650. SACKSTON, W. E.
***Botrytis cinerea* and *Sclerotinia sclerotiorum* in seed of safflower and sunflower.**
Plant Dis. Reptr, 1960, **44**: 664-8, bibl. 14, illus.

B. cinerea and *S. sclerotiorum*, both causing head rot, were isolated from surface-sterilized seeds of safflower. Dissemination of the pathogens may be reduced by using seeds from fields free of head rot and, as a further precaution, by treating the seeds with Ceresan M.—Canada Dep. Agric. Res. Stat., Winnipeg.

6651. SCHUSTER, M. L., AND NULAND, D. S.
Seed transmission of safflower *Verticillium* wilt fungus.
Plant Dis. Reptr, 1960, **44**: 901-3, bibl. 3.

In a field test 9% of a population of 370 seeds selected as being likely to carry the disease contained the fungus. Seeds from safflower grown in greenhouse soil infested with *Verticillium* were 23% infected. *Verticillium* isolates from potatoes were pathogenic to safflower and isolates from safflower infested potatoes.—Neb. agric. Exp. Stat., Lincoln.

Sugar maples.

6652. DUNN, S., AND EGGERT, R.
Propagation of woody plants.
Stat. Bull. N.H. agric. Exp. Stat. **465**, 1959, pp. 12, bibl. 4, illus.

In a 5-year study to determine the best method of propagating sugar maple by softwood cuttings, comparisons were made of 6 types of propagating bed, constant and intermittent mist, 3 rooting media and various growth substances. The highest rooting percentage (37%) was obtained in an outdoor bed provided with constant mist and cloth shade. Sawdust proved a better rooting medium than sand or perlite. Treatment with Hormodin No. 3 powder or 0·1% IBA dip slightly improved rooting, but it is considered doubtful whether the advantage justified the extra labour. Clonal variations in rooting response were pronounced. Survival of rooted cuttings was very low, and possible methods of overwintering the cuttings are discussed. In further limited tests cuttings of the apple rootstock *Malus robusta* No. 5 and of hazel-filbert hybrids rooted satisfactorily in sawdust in an outdoor bench under constant mist. Terminal cuttings of *M. robusta* gave an average of 72% rooting, compared with only 20% for lateral cuttings.

6653. KRIEBEL, H. B.
Inheritance controls leafing-out and leaf-fall of shade trees.
Ohio Fm Home Res., 1961, **46**(1): 12, 14, illus.

In test plantations in Ohio sugar maples grown from seed collected from northern regions leafed-out 2–3 weeks earlier than seedlings from the south. Trees from northern seed dropped their leaves earlier in the autumn than those from southern seed. Among a batch of seedlings from a single seed source genetic variations also influenced the time of leafing-out and leaf-fall.

6654. HAQ, S., AND ADAMS, G. A.
Oligosaccharides from the sap of sugar maple (*Acer saccharum* Marsh).
Canad. J. Chem., 1961, **39**: 1165-70, bibl. 31.

The isolation and identification of 2 trisaccharides are described: these are not related in either composition or structure to the polysaccharides present in the sap or the wood.

Tannin plants.

(*See also* 6589.)

6655. ROUX, D. G., MAIHS, E. A., AND PAULUS, E.
Condensed tannins. 9. Distribution of flavonoid compounds in the heartwoods and barks of some interrelated wattles.
Biochem. J., 1961, **78**: 834-9, bibl. 26.

The possible significance of the relative distribution of heartwood and bark components to the taxonomy of *Acacia* spp. is discussed.—Rhodes Univ., Grahamstown, S. Afr.

Sundry plants.

6656. MORTON, J. F.
Can annatto (*Bixa orellana* L.), an old source of food color, meet new needs for safe dye?
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 301-9, bibl. 73, illus.

Botanical characteristics, varieties, culture, medicinal and other uses, harvesting and extraction of the colouring matter bixin are described and the prospects of using annatto to replace other dye stuffs are discussed.—Univ. Miami, Coral Gables.

6657. PERDUE, R. E., JR., AND CREECH, J. L.
Quadrangular bamboo.
Econ. Bot., 1961, **15**: 87-90, illus.

Quadrangular culms may be obtained from *Phyllostachys pubescens* by constructing wooden frames over the young shoots which are forced to elongate through them.—U.S.D.A., Beltsville, Md.

6658. CRUZADO, H. J., MUZIK, T. J., AND KENNARD, W. C.
Control of bamboo in Puerto Rico by herbicides.
Weeds, 1961, **9**: 20-6, bibl 7, illus.

Of 20 herbicides tested against unwanted bamboo, TCA, dalapon, monuron and amitrol showed most promise.—From *Weed Abstr.*, **10**, No. 530.

6659. GLOBA-MIHAJLENKO, D. A.
A biological method for the control of black rot in cork oak. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(7): 35.

Chemical measures for the control of *Phytophthora* *cinnamomi*, causing black rot of cork oak, are ineffective, and the fungus damages more than 50–60% of some plantations in the subtropical regions of the Soviet Union. Complete resistance to the disease was obtained by grafting the cork oak onto an Iberian oak [*Q. iberica*] rootstock.

6660. Mukherjee, A. K., Choudhury, D., and Bagchi, P.
Constitution of the galactomannan from the kernel of green palmyra palm nut (*Borassus flabellifer* Linn.).
Canad. J. Chem., 1961, **39**: 1408-18, bibl. 43.

FLORICULTURE.

General.

(*See also* 5637, 5638, 7253, 7258.)

6661. Kavka, B.
Vývoj, organizace a činnost výzkumného ústavu okrasného zahradnictví v Průhonicích. **(Development, organization and activity of the Research Institute for Ornamental Horticulture in Pr˚honice.)**
Véd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 7-34, illus.
Anon.
Výzhumný ústav okrasného zahradnictví v Průhonicích. **(The Research Institute for Ornamental Horticulture in Průhonice.)** [In Czech, Russian, English and German.]
Acta Průhoniciana, 1960, No. 1, pp. 1-11.

Experimental work in Průhonice started in 1927, on an estate which includes a famous park, and after several changes [see also *H.A.*, 31: 3826] the Institute attained its present status in 1956. Its main objectives are the investigation of all problems relating to the cultivation of ornamental plants and their uses in gardens and landscape work. The Institute comprises 6 departments, the functions of which are briefly outlined. The first article includes a list of papers published by members of the staff.

6662. Mathias, M. E., and others.
Ornamentals for low-elevation desert areas of southern California.
Circ. Calif. agric. Ext. Serv. **496**, 1961, pp. 35, illus.

6663. Lacey, D. B.
Ground covers—carpets for outdoor living.
Ext. Bull. Coll. Agric. Rutgers St. Univ. **351**, 1961, pp. 4, illus.

Brief notes on low-growing ornamental plants for sun, shade, seashore and wet-soil planting; their uses, planting and maintenance.

6664. Yeager, A. F., and others.
Breeding and improving ornamentals.
Stat. Bull. N.H. agric. Exp. Stat. **461**, 1959, pp. 20, illus.

This bulletin describes briefly work in New Hampshire on the breeding and selection of azaleas, callas, chrysanthemums, coleus, dwarf conifers, geraniums, gladioli, gloxinias, lilac, monardas and rambler roses. With azaleas both native and introduced species have been studied, one of the main characteristics sought being hardiness. With chrysanthemums work on *C. sibiricum* has resulted in the development of 10 named varieties each bearing the prefix Granite. New types of coleus have resulted from treatment of *C. blumei* with colchicine. Several new lilac varieties are described briefly; most of these belong to *Syringa vulgaris*, but one of them, Miss Kim, is believed to be the first named variety of *S. velutina*. Among rambler roses descriptions are given of the varieties White Mountains, Grafton Pillar and Durham Pillar, and there are brief notes on several promising seedlings, as yet unnamed.

6665. Riehl, G.
Die "optimale" Vermehrungstemperatur. **(The optimum propagation temperature.)**
Gartenwelt, 1961, **61**: 119-20, bibl. 13, illus.

Rooting of many herbaceous and woody ornamental species occurred most quickly at average temperatures which were relatively high, in the range 25–30° C. Fuchsia cuttings in water rooted 8–10 days earlier at 25° C. than at 10–15° C. Cuttings of *Chrysanthemum indicum* rooted 100% in 5¾ days in one case at a soil temperature of 29° C. (air temperature 23° C.); rooting at 16·2° C. in a moist medium, however, was quicker than rooting at 23° C. in a drier medium. The author emphasises the importance of maintaining satisfactory levels of light and water when propagating at higher temperatures.

6666. Kyndl, J.
Zjišťování vlivu předplodin na výnos semen u hlavních druhů letniček a dvouletek a na výnos hlíz u mečíků. **(The determination of the influence of preceding crops on the seed yield in the main species of annual and biennial flowers and on the corm yield in gladioli.)** [English, Russian and German summaries ¾ p. each.]
Véd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 131-54, bibl. 7.

In an attempt to promote flower seed and gladiolus corm production in Czechoslovakia experiments were conducted on the influence of several preceding crops on 9 flower crops grown with and without a pre-planting application of Citramfoska (7% N, 10% P_2O_5, 14% K_2O, 10% CaO). The highest seed yields of marigolds (*Tagetes*) were obtained without the fertilizer following barley undersown with a grass-legume mixture; antirrhinum with fertilizer following carrots; sweet peas without fertilizer following potatoes; asters (*Callistephus*) with fertilizer following cabbage; helichrysum with fertilizer following cereal-grass-legume; verbena without fertilizer following potatoes; godetia without fertilizer following asters; *Myosotis alpestris* with fertilizer following pansies; *Bellis perennis* without fertilizer following potatoes. The size and total weight of gladiolus corms were highest with or without fertilizer following potatoes. The absolute weight of (1,000) seeds and their vitality were only slightly affected by the preceding crops. There was no relationship between the seed yield per plant and average weight of the plant.

6667. Soukup, J., and Matouš, J.
Nové směry ve vývoji zahradnických zemin. **(New trends in the development of garden composts.)** [English, Russian and German summaries ½ p. each.]
Véd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 101-28, bibl. 28.

Six types of loam were tested in 1:1 loam-peat mixtures used for growing *Cineraria hybrida*, *Cyclamen persicum*, *Primula malacoides* and *P. obconica*. The reactions of the species to the loams differed; in particular, plants sensitive to high osmotic pressure of the soil solution, such as *P. malacoides*, suffered physiological chlorosis with the more fertile highly hygroscopic loams. When, however, the moisture content was maintained at its optimum by sub-irrigation the plants made normal growth. The replacement of peat by leaf mould resulted in more vigorous growth in all species. The differences produced by the different loams were more marked in the early stages of growth than later. It is thought that reducing the pH values of the composts by increasing the peat content would prove advantageous with the loams tested.

6668. Fitos.
Théorie et pratique du développement controlé des racines dans la culture en pots de tourbe. **(The theory and practice of controlled root development in peat pots.)**
Bull. hort., Liège, 1961, **16**: 25-35, illus.

Root development in the traditional plant pot and in the Jiffy pot is compared, and the culture in Jiffy pots is described of pelargonium, cyclamen, carnation, chrysanthemum, tomato, lettuce, french bean, strawberry and various ornamental plants.

6669. Heeney, H. B., Miller, S. R., and Chan, A. P.
Relationship between plant composition and yield.
Progr. Rep. Hort. Div., centr. exp. Fm, Ottawa, 1954-58, 1960, pp. 51-2.

Tomatoes: Field studies have shown that the critical content of total P in the third lamina from the shoot apex before the first bloom appears is 0·35–0·4%; K levels in the dry matter of leaf blades should be 3·5% for maximum production. *Peas:* For maximum yields of shelled peas the percentage of nutrients in the dry matter of the 3rd leaf from the stem apex at the 5–8-node stage have been tentatively established as 3·5% N, 0·20% P and 2·5–3·0% K. *Carnations:* A satisfactory linear relationship was shown to exist between yield and N level in the growing tips of sand-cultured Apollo carnations; a N level of 1,000–2,000 p.p.m. on a fresh weight basis was tentatively accepted as optimal, and yields were highest when the N/P ratio was 2 to 2·5 and the N/K ratio 0·25 to 0·30. *Chrysanthemums:* The variety Shasta in greenhouse sand culture showed an excellent relationship between the N/K ratio in leaves and the yield when measured as stem weight; for maximum yields the N/K ratio should be maintained within a range of 1 to 2, and within this range yields increased as the total N increased to at least 5%. *Roses:* N/K ratios in the leaves were related to yields, and there were indications that for maximum yields the ratio should be kept at a minimum.

6670. Chan. A. P.
Floriculture research.
Progr. Rep. Hort. Div., centr. exp. Fm, Ottawa, 1954-58, 1960, pp. 71-8.

Carnations. Flowering was tentatively related to hours of sunshine during growth. There are indications that some carnation varieties benefit from growing temperatures slightly higher (3–5° F.) than normal (48–50° F.). Carnations did not respond to photoperiodic treatment, but supplementary light during the night increased production and induced earlier flowering; these effects were attributed to increased total light energy rather than to day length. Clones have been selected with resistance to calyx-splitting, but their flowers have fewer petals than the commercial lines. *Chrysanthemums.* In nutritional studies stem length, weight of tops and numbers of flower buds increased as N was increased. The weight of tops was adversely affected by increasing P levels. Potassium affected all the growth measurements under observation, and the interaction N × K was highly significant for all of them except stem length. *Roses.* Leaf samples were best analysed on an ash basis, but no definite conclusions on sampling can yet be drawn. It seems that for good growth of roses the following nutrient levels are required: N at 2·8–3·0%, P at 0·28–0·30%, and K at 2·4–2·6%. *Poinsettias.* Misting of rooted cuttings on arrival after shipping improved survival. The flowering of plants grown at 62° F. night temperature could be delayed by supplementary illumination. *Kalanchoës.* A guide for photoperiodic control of flowering is given. A high N level of 360 p.p.m. caused severe stunting but did not affect the date of flowering; with N supplied at 20 p.p.m. N deficiency symptoms were apparent but not severe. DDT was phytotoxic, but demeton could be used without injury. *Supplementary illumination.* Flowering of snapdragon seedlings was advanced by 3 weeks of supplementary lighting (with incandescent, fluorescent and mercury-vapour lamps at 10 watts/sq. ft.) during the seedling stage, but flower quality was relatively poor with incandescent lighting. *Gibberellic acid.* Painting a solution of 10 p.p.m. GA on the calyx did not prevent splitting of carnations. The diameter of chrysanthemum flower heads was not increased by GA sprays; but GA proved a successful substitute for vernalization of stools. Spraying snapdragon spikes with 100 p.p.m., when the lower florets were just showing colour, resulted in improved lasting quality of the lower florets and an increase in spike length.

6671. JANSEN, H.
Untersuchungen zur praktischen Anwendung der Gibberellinsäure im Gartenbau, insbesondere im Zierpflanzenbau. **(Studies on the practical application of gibberellic acid in horticulture, especially in the culture of ornamentals.)** [English and French summaries ½ page each.]
Gartenbauwiss., 1960, **25**: 249-86, bibl. 39, illus.

The quality of the light was found to have no effect on the GA reaction, but increases in day length enhanced responses to it. KNO_3 and purine were useful in many cases to counteract the deleterious effects of GA. Two preparations gave good results; these contained either 10 or 50 p.p.m. of GA, 2,000 p.p.m. of KNO_3, 500 p.p.m. of purine and 10 p.p.m. of a wetter, Texapon. Recommendations are made for using GA on numerous ornamentals.—Inst. Bot., Fak. Gartenb. Landeskult., Hannover.

6672. NYHLÉN, Å.
Försök med ogräsbekämpning under 1959. **(Weed control trials in 1959.)**
Sverig. HandelsträdgårdsmForb. Årsb. 1959, reprinted as *Särtrycksser. Trädgårdsförs. Alnarp* **116**, pp. 8.

Brief notes are given on the results of herbicide applications to control weeds in roses, freesias, gladioli, anemones, chrysanthemums, stocks, carnations, *Viola cornuta*, leeks, carrots, lettuces and strawberries [see also *H.A.*, 30: 3661].

6673. BESEMER, A. F. H., AND TACONIS, P. J.
Ervaringen met de bestrijding van meeldauw in enkele gewassen. **(Mildew control in various crops.)**
From summary in *Tijdschr. PlZiekt*, 1961, **67**: 62-3.

Several new fungicides are listed, which have given effective control of mildew on *Crataegus*, *Quercus*, apples, roses (both indoor and outdoor), begonias and chrysanthemums.

6674. PERRY, V. G.
Nematodes affecting ornamental plants in Florida.
Proc. Fla St. hort. Soc. 1960, 1961, **73**: 397-401.

With suggestions for their control.

6675. MILLER, H. N., AND PERRY, V. G.
A promising new chemical dip for the control of nematodes in ornamental plants.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 338-42, bibl. 8.

Nematode infested, bare-root plants of gardenia, sansevieria, rose, aglaonema, pothos and pilea were dipped for 24 hours in Shell experimental nematicide SD 4965 at 200 and 400 p.p.m. The nematodes were eliminated from many of the plants or were reduced to very low levels. SD 4965 caused foliage injury on several plants, but, if only the roots were dipped, no injury occurred.—Fla agric. Exp. Stat., Gainesville.

6676. FURBAY, W. M.
An analysis of the sale of inexpensive cut flowers and potted plants through supermarkets.
Diss. Abstr., 1961, **21**: 2144, being *L.C. Card No. Mic.* 60-6366 of 141 pp.

Carnations.

(*See also* 5725, 6669, 6670.)

6677. DE RAVEL D'ESCLAPON, G.
La culture de l'oeillet américain á Antibes. **(The culture of the American carnation at Antibes.)**
Rev. hort., Paris, 1961, **133**: 44-50, illus.

Where William Sim and related varieties are largely replacing the Nice carnation.

6678. SCHUPPER, J. F. B. M.
Onderzoek naar de opbrengsten van Amerikaanse anjers in het Westland. **(Studies on carnation yields in the Westland.)**
Overz. Landb.-Econ. Inst., 's Gravenhage, **175**, 1960, pp. 20.

Figures were collected in 1959 from 12 holdings in the Westland, mostly growing a mixture of flowers and vegetables. Tables show the yields of carnations per sq. m. of glasshouse area, the income per month and per year, the average price per flower and the monthly percentage of the crop which was more than one year old.

6679. Brooks, H. J.
A cytological and genetical study of the carnation, *Dianthus caryophyllus*, with special reference to the production of triploids.
Diss. Abstr., 1961, **21**: 1716, being *L.C. Card No. Mic.* 60-5218 of 104 pp.

A cytological study of carnations showed that triploids are produced with difficulty from reciprocal diploid-tetraploid crosses and that the carnation tolerates a high degree of aneuploidy. The genetic background of doubleness and flower colour was studied. Colchicine-produced, tetraploid Chabaud hybrids grew as well as diploid carnations, although other tetraploid carnation seedlings grew very slowly.—Univ. Conn.

6680. (Holley, W. D., and Lehman, F. M.)
Spacing patterns for carnations.
Flor. Exch., 1961, **136**(21): 62, 64.

There was little difference in the yield or quality of carnations (William Sim) between the 6 spacing patterns and plant densities tested.

6681. White, H. E.
The effect of supplementary light on growth and flowering of carnations (*Dianthus carophyllus*).
Proc. Amer. Soc. hort. Sci., 1960, **76**: 594-8, bibl. 5.

In 1957-58 Red Sim carnations potted on 30 December received supplementary light to provide 14-hour photoperiods from 13 January to 21 April. Plants so treated flowered 28–34 days earlier than plants grown without supplementary light, the response being greater at a night temperature of 62° F. than at one of 55° F. Total flower production was not affected by photoperiod, light intensity or temperature. [See also *H.A.*, 30: 4154.] In 1958-59 plants set in benches on 11 July were given 14-hour photoperiods from 18 August to 21 April. Once again the plants receiving supplementary light flowered earlier than those grown in natural day lengths, and in addition flower production was increased during the period November to April. The supplementary light did not affect flower quality or the number of flowers with split calyces. —Univ. Mass., Amherst.

6682. Oertli, J. J.
Die Verteilung des Bors in Nelken. **(The distribution of boron in carnations.)** [English and French summaries $\frac{1}{3}$ p. each.]
Gartenbauwiss., 1960, **25**: 287-92, bibl. 6, illus.

Carnations were grown in culture solution and soil with different levels of B ranging from deficiency to toxicity. Deficiency is associated with a pale yellow zone along the midrib, which later becomes purple. Where toxicity occurs, there is an accumulation of 3,000–5,000 p.p.m. of B in the leaf tips accompanied by tip burn symptoms. Tissues suffering from deficiency often contain less than 10 p.p.m. of B.

6683. Bestagno, G.
Danni da cromo contenuto in un concime misto su colture di garofano. **(Injuries to carnation crops from chromium in a mixed manure.)** [English summary 8 lines.]
Not. Mal. Piante, 1960, No. 53/54, pp. 217-26, bibl. 6, illus.

When applied to carnation crops at rates ranging up to 45 g. per plant an organic manure containing 0·24% Cr caused stunting, yellowing and abnormalities of foliage, flower and root. In tests on carnations with inorganic chromium compounds the chromate and bichromate of sodium and potassium were lethal and the sulphate and chloride of chromium were merely injurious, but the symptoms were not the same as with the organic manure. —Osserv. Mal. Piante, Sanremo.

6684. van Os, H.
Ervaringen bij de meristeemcultuur van anjers. **(Meristem culture of carnations.)**
From summary in *Tijdschr. PlZiekt.*, 1961, **67**: 59.

When meristems were cultured from carnation plants grown at 37° C. for 10 days, the percentage of virus-free plants obtained was only 1·1%. There are indications that treatment for 20 days would be better for virus suppression.

6685. Thomsen, A.
Termoterapeutiske behandlinger af nelliker. **(Thermotherapeutic treatment of carnations.)** [English summary $\frac{1}{2}$ p.]
Horticultura, 1961, **15**: 136-9, bibl. 2, illus.

Carnation plants grown at 37° C. (day length 14 hours) showed an increasing proportion of etiolated shoots as warm-culture treatment was continued for 6 weeks, and these became necrotic after 8 weeks' treatment. Warm treatment for 4 or 8 weeks eliminated ringspot virus, but not other viruses, in rooted cuttings.—St. plantepat. Forsøg, Lyngby.

6686. Sanderson, K. C., Shanks, J. B., and Link, C. B.
The relationship and severity of several soil borne carnation diseases as affected by root medium and fertilization.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 599-608, bibl. 14.

A complex experiment is described in which carnations treated in various ways were inoculated with *Rhizoctonia solani*, *Pseudomonas caryophylli* and the carnation pin nematode, *Paratylenchus dianthus*. No evidence was found that any one of these pathogens altered the relative resistance of the plants to the other pathogens. The relative resistance of carnations to *R. solani* was increased by good soil drainage, shallow planting of cuttings and a low or medium fertility level. The relative resistance of the plants to *P. caryophylli* was increased by an adequate supply of Ca (liming) and by low N, and also by low P where the N supply was high. In a second experiment involving inoculations with *P. caryophylli* low N increased the survival of plants with both wounded and unwounded roots, additional Ca increased the survival of wounded plants and low P aided the survival of unwounded plants. The effect of soil pH, altered by sodium hydroxide as opposed to calcium, depended on whether the plant roots had been wounded or left intact. The greatest loss of wounded plants occurred at a medium pH (6·5) and of unwounded plants at a high pH (8·2).—Univ. Md, College Park.

6687. Bestagno, G.
L'influenza dello stato fisico dei terreni e dei trattamenti sterilizzanti sulle "morie" del garofano. **(The effect of the physical condition of the soil and of sterilization treatment on carnation rots and wilts.)** [English summary 8 lines.]
Not. Mal. Piante, 1960, No. 53/54, pp. 195-213, bibl. 17, illus.

In field and glasshouse trials on carnations for the control of parenchymatous rots (*Fusarium roseum*, *Rhizoctonia solani*) and of wilts (*F. oxysporum* f. *dianthi*, *Phialophora cinerescens*, *Rhizoctonia* sp.), and also on Caen anemones, in 1958-59 and 1959-60 the treatments were Flotal at 20 or 80 ql. per ha. with and without Vapam at 500 kg. per ha. The results were: (1) Flotal plus Vapam increased production by 40–78 and 53–58%, respectively, in carnations and anemones, and the value of the crops by 48–81 and 75–87%, respectively; (2) Flotal alone increased production by 20–54 and 25–30%, respectively, and value by 25–33 and 45–50%, respectively; (3) plant losses through disease were 22–35% in the control, 8–13% with Flotal and 1·7–3·3% with Flotal plus Vapam; (4) Flotal made it possible to reduce the number of cultivations in carnation crops from 12–14 to 4 and prevented water-logging in wet weather.—Osserv. Mal. Piante, Sanremo.

6688. Mokrá, V.
Ochrana karafiátů proti skvrnitosti hvozdíkové (*Heterosporium echinulatum* (Berk.) Cooke). Sdělení I. **(The protection of carnations against *Heterosporium echinulatum*. Report I. A contribution to the biology of *H. echinulatum*.)** [English, Russian and German summaries ½ p. each.]
Věd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 207-23, bibl. 44, illus.

Including results of laboratory experiments with fungicides normally used as sprays and with seed disinfectants.

6689. Terrosi, U.
Ricerche sull'attività biologica del maneb. I. Prove sperimentale contro l'*Uromyces caryophyllinus* Wint. **(Investigations on the biological activity of maneb. I. Trials against *Uromyces caryophyllinus*.)**
Not. Mal. Piante, 1960, No. 53/54, pp. 139-46, bibl. 6.

In trials on the winter-flowering carnation varieties Mirabella and Rovigo for the control of rust 16 weekly applications of 65% zineb at 300 g. per hl. or of maneb at 150 or 200 g. per hl. at the rate of 500 l. water per ha. were made between 19 May and 12 October. The best results were obtained with 0·2% maneb, which gave complete control.

Chrysanthemums.

(*See also* 5603, 5693, 6242, 6483, 6665, 6669, 6670, 7287.)

6690. Kaukovirta, E.
Alustan ja hormoonikäsittelyn vaikutus krysanteemin pistokkaiden juurtamiseen koetulosten valossa. **(The influence of the rooting medium and of hormone treatment on the rooting of chrysanthemum cuttings.)**
Puutarha, 1961, No. 4, pp. 198-200.

Chrysanthemum cuttings rooted best in vermiculite (6 cm. deep) or in a 4-cm. layer of sand above a 2-cm. layer of peat. The use of a hormone (Rootone) resulted in more even and prolific rooting.—Inst. Hort., Univ. Helsinki.

6691. Ying, H.-K., and Joiner, J. N.
The effect of sources and levels of nitrogen on the growth and flowering of potted chrysanthemums.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 401-4, bibl. 4.

The test varieties were Humdinger and Yellow Delaware, the N sources ammonium nitrate, Uramite and Milorganite and the levels the equivalent of 3, 6 and 12 lb. of an 8:8:8 fertilizer per 100 sq. ft. Source of N had less effect than quantity. Ammonium nitrate at the medium level gave better results than at the low level, and as good results as at the high level. Uramite produced significant growth increases only as between the lowest and highest levels. Milorganite at the high level produced the largest flowers and best foliage colour and stem growth. The results suggest that where only one application of N is made a mixture of organic and inorganic forms may be desirable.—Univ. Fla, Gainesville.

6692. Joiner, J. N., and Smith, T. C.
Some effects of nitrogen and potassium levels on flowering characteristics of *Chrysanthemum morifolium*, ''Bluechip''.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 354-8, bibl. 7.

Chrysanthemums were grown in sand cultures with 4 levels each of N and K [see *H.A.*, 31: 1075] from 26 April to 18 August and from 14 October to 29 December. In the first experiment linear and higher order relationships were found between the nutrient levels and the time taken to flower, intensity of flower colour and total soluble sugar content of the flowers. None of these factors was influenced by treatment in the second experiment. In both trials the yield, expressed as number of flowers × flower diameter, increased with increased rate of applied N up to the 3rd level (200 p.p.m.).—Univ. Fla. Gainesville.

6693. Miller, R. O., and Kiplinger, D. C.
Research conducted to help reduce chrysanthemum quilling.
Ohio Fm Home Res., 1959, **44**: 76-7, illus.

Attempts to prevent quilling (the development of tubular florets giving a ragged appearance) in Indianapolis White and Improved Indianapolis White by treatment with dark periods of various lengths and by an interrupted dark period were unsuccessful, although differences were observed in the amounts of quilling between treatments. Interrupted photoperiodic treatment produced somewhat better flowers, but none of the treatments produced better flowers than those produced by the same varieties under natural conditions in spring and autumn.

6694. Cathey, H. M., and Marth, P. C.
Effectiveness of a quaternary ammonium carbamate and a phosphonium in controlling growth of *Chrysanthemum morifolium* (Ramat.).
Proc. Amer. Soc. hort. Sci., 1960, **76**: 609-19, bibl. 12, illus.

The effects of time and mode of application of a quarternary ammonium carbamate (4-hydroxy-5-isopropyl-2-methylphenyl trimethylammonium chloride, 1-piperidine carboxylate), called Amo-1618, and the iodide salt of this compound, called Amo-1619, as well as a phosphonium (2,4-dichlorobenzyltributyl phosphonium chloride), called Phosfon, were studied on the growth of *Chrysanthemum morifolium*. Amo-1618 was found to be effective as a growth retardant when mixed with the soil prior to planting of the cutting, when the basal ends of rooted or unrooted cuttings were soaked in an aqueous mixture, or when the growing points were sprayed with an aqueous mixture. The development of much darker green leaves than those found on the untreated plants was associated with the retardation of growth. Amo-1619 proved to be too phytotoxic for use on chrysanthemum. Phosfon was only effective as a growth retardant with a margin of safety, when it was applied to the soil before planting or after planting as a drench. Plants treated with Phosfon in soil were retarded similarly to plants treated with an equal molar concentration of Amo-1618. Elongation of the stem was retarded, and flowering was delayed in proportion to the concentration of the chemicals. Retardation of growth was not associated with the development of dormancy or a rest period. Initiation of flowers occurred when the plants were placed in short photoperiods after all treatments. [Authors' summary].—U.S.D.A., Beltsville, Md.

6695. Gartner, J. B., and McIntyre, M. L.
The effects of Phosfon-D as a growth inhibitor on chrysanthemums.
Ill. St. Flor. Ass. Bull., 1961, No. 214, pp. 4-5, illus.

Phosfon-D (tributyl-2,4-dichlorobenzylphosphonium chloride), when used at rates of 5 g. or more per cu. ft. of potting compost, delayed flowering by 1–3 weeks and reduced plant height by 50% or more. At 1–3 g./cu. ft. Phosfon-D decreased plant height by 30–40% without affecting time of flowering. Flower size and quality were not affected by any Phosfon treatment.—N.C. St. Coll., Raleigh.

6696. Tayama, H., and Kiplinger, D. C.
Marginal necrosis of chrysanthemum foliage.
Flor. Exch., 1961, **136**(18): 15, 70.

The effects of soil moisture, fertilizing, Systox and light intensity on chrysanthemum foliage were studied in preliminary tests. No conclusive evidence was obtained. Symptoms were more severe on the varieties Blue Ribbon and Mermaid than on Criterion and Oregon.—Ohio agric. Exp. Stat., Wooster.

6697. Woltz, S. S., and Jackson, C. R.
Relationship of amino acids to yellow strapleaf of chrysanthemums and similar disorders.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 381-4, bibl. 7, illus.

Of the isomers of leucine and isoleucine tested by soil application DL-alloisoleucine was the most effective in inducing the physiological disorder yellow strapleaf, whereas D-leucine was completely ineffective at the rate used. D- and L-methionine produced an abnormal growth pattern, for which the authors suggest the name methionosis. [See also *H.A.*, 30: 5822.]

6698. Jackson, C. R., and Woltz, S. S.
Effects of certain heat treatments on the incidence of yellow strapleaf disease of chrysanthemum.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 389-94, bibl. 7.

Prolonged soil heat treatments were effective in preventing the development of yellow strapleaf of chrysanthemum in the greenhouse. Heating aqueous suspensions of the YSL soil and roots at 85° C. for 30 minutes also largely prevented the disease. The disease occurred when cultures of microorganisms prepared from suspensions of YSL soil and roots were added to autoclaved soil. This evidence of the causal nature of microorganisms does not conflict with information on the contributory nature of certain soil conditions associated with YSL. [From authors' summary.]—Gulf Coast Exp. Stat., Bradenton.

6699. BOLICK, J. H.
Bacterial bud blight of chrysanthemum.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 346-51, bibl. 10, illus.

The symptoms are a blackening of the involucral bracts and the spreading of the necrosis into the receptacle and peduncle causing an eventual collapse of the peduncle and dropping of the bud. The causal organism is a species of *Pseudomonas* closely related to *P. calendulae* or *P. cichorii*. [From author's summary.]—St. Plant Board Fla, Gainesville.

6700. BAKER, K. F., DIMOCK, A. W., AND DAVIS, L. H.
Cause and prevention of the rapid spread of the *Ascochyta* disease of chrysanthemum.
Phytopathology, 1961, **51**: 96-101, bibl. 16, illus.

The key to the prevention of further spread of the disease caused by *Mycosphaerella ligulicola* (*Ascochyta chrysanthemi*) is by the use of pathogen-free stock, produced only in areas remote from other chrysanthemum growing regions, under a programme which involves soil treatment with heat or chemicals, the use of clean planting stock, the destruction of all infected material over a considerable area, the frequent application of fungicides and the avoidance of overhead watering. [From authors' summary. See also *H.A.*, 29: 3864 and 31: 4993.]—Univ. Calif., Los Angeles, and Cornell Univ., Ithaca, N.Y.

6701. TOOP, E. W.
***Verticillium* and *Fusarium* wilts of chrysanthemum and the use of cycloheximide as a chemotherapeutant.**
Diss. Abstr., 1961, **21**: 2853-4, being *L.C. Card No. Mic.* 61-947 of 75 pp.

The greatest development of the two wilts, *Fusarium oxysporum* f. *callistephi* and *Verticillium albo-atrum*, was obtained when rooted cuttings were allowed to initiate new roots before lifting, the roots were dipped in the inoculum and then replanted. Cycloheximide oxime when applied through the roots was not markedly phytotoxic at levels up to 500 mcg./ml., whereas the parent material, cycloheximide, was toxic at this level. *Fusarium* growth was checked by both formulations at all concentrations between 25 mcg./ml. and 1,000 mcg./ml., but was completely inhibited only by 1,000 mcg./ml. of cycloheximide. *Verticillium* was completely inhibited at 500 mcg./ml. and 1,000 mcg./ml. of cycloheximide. It is concluded that neither formulation of Actidione was effective as a chemotherapeutant for the control of these wilts.—Ohio St. Univ.

6702. ATKINSON, R. G., AND ORCHARD, W. R.
Resistance of outdoor chrysanthemum varieties to rust.
Canad. Plant Dis. Survey, 1960, **40**: 109.

Disease ratings for *Puccinia chrysanthemi* ranged from nil to severe on 31 varieties.

6703. HESLING, J. J., AND WALLACE, H. R.
Observations on the biology of chrysanthemum eelworm *Aphelenchoides ritzema-bosi*. (Schwartz) Steiner in florists' chrysanthemum. I. Spread of eelworm infestation. II. Symptoms of eelworm infestation.
Ann. appl. Biol., 1961, **49**: 195-203, illus., and 204-9, bibl. 21, illus.

The main source of infestation was the chrysanthemum stool, as few eelworms overwintered in the soil. Eelworms did not spread laterally more than 30 in. from the point of infestation. They were most active under humid conditions [see also *H.A.*, 30: 994] and the number of infested chrysanthemum varieties greatly increased in September during periods of heavy mists. Infested plants showed leaf blotches, stunting, blindness, browning of the stems and petioles, leaf distortion, leaf scars on feeding areas and puffy, blistered and puckered leaves.—Rothamsted exp. Stat., Harpenden.

6704. WALLACE, H. R.
The nature of resistance in chrysanthemum varieties to *Aphelenchoides ritzemabosi*. [German summary ¼ p.]
Nematologica, 1961, **6**: 49-58, bibl. 4, illus.

Leaves of chrysanthemum varieties that are resistant to *A. ritzema-bosi* brown rapidly when infested. In these leaves the gravid females move about piercing hundreds of cells which subsequently turn brown. In susceptible varieties the females do not move, piercing few cells but laying many eggs. This difference in behaviour is attributed to the absence of a nutritional factor in the leaves of resistant varieties.—Rothamsted exp. Stat., Harpenden.

6705. HESLING, J. J., AND WALLACE, H. R.
Observations on the susceptibility of chrysanthemum varieties infested at two different times with chrysanthemum eelworm, *Aphelenchoides ritzemabosi*. [German summary 8 lines.]
Nematologica, 1961, **6**: 64-8, bibl. 3.

The susceptibilities of chrysanthemum varieties to

A. ritzema-bosi, assessed from a field experiment in 1959 [see *H.A.*, 31: 4994], were confirmed in 1960. Many plants infested in March were subsequently destroyed by eelworm, whereas infestations in August had no effect on the flower crop, although eelworm symptoms were present. In resistant varieties infested in August there was no spread of symptoms, because infested leaves were killed before the eelworms could multiply. Cuttings of resistant varieties, which are hypersensitive to eelworm attack, were often killed.—Rothamsted exp. Stat., Harpenden.

6706. Dennis, E. B.
Some symptoms of spray damage to chrysanthemums.
Comm. Gr, 1961, No. 3413, pp. 1289-91, illus.
Details of foliar injury following organophosphorus sprays applied for aphid control.

Other annual and herbaceous plants.

(*See also* 5613, 5627, 5629, 5684, 6590, 6665-6667, 6670, 6765, 7247, 7264, 7288.)

6707. Steuckardt, R.
Mutationsversuche mit Sommerastern (*Callistephus chinensis*). (**Mutation studies with China asters.**) [Russian and English summaries ¼ p. each.]
Arch. Gartenb., 1961, **9**: 85-95, bibl. 14, illus.
An X-ray dose between 4 and 5 Kr was found to be optimal for aster seeds. Most of the mutations produced were chlorophyll mutations, but changes were also induced in stem length, flower colour and shape and time of flowering.—Inst. PflZücht., Friedrich-Schiller-Univ., Jena, Dornburg-Saale.

6708. Gruis, J. T., and Joiner, J. N.
The effect of periods of long days and levels of fertilization on China aster, *Callistephus chinensis*, "All Saints".
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 378-81, bibl. 5.
A split-plot design was used to combine 2, 4 and 8 lb. of a fertilizer, equivalent to an 8–0–8 analysis, and 7, 10 and 13 weeks of long days were provided by supplemental light to increase day length to 15 hours. Plants receiving 7 weeks of long days flowered 12 and 19 days earlier than those receiving 10 and 13 weeks, respectively. Earliness in flowering was, however, associated with shorter stems and fewer and smaller flowers. Flower size was not affected by fertilizer levels, but stem length and number of flowers were generally reduced by the 2 and 8 lb. levels. It appeared that the 4 lb. level of fertilization combined with the 10-week long-day treatment produced the most desirable plants. [From authors' summary.]—Univ. Fla, Gainesville.

6709. Lenander, S. E., and Johansson, J.
Sortförsök med delphinium, 1951-57. (**Variety trials with delphinium, 1951-57.**) [English and Esperanto summaries ½ p. each.]
Medd. Trädgårdsförs. Alnarp **133**, 1960, pp. 23, bibl. 8, illus.
The behaviour (the duration and abundance of flowering, disease resistance and winter hardiness) of 49 varieties was observed at 6 places in Sweden, the most northerly being Östersund (63° N.).

6710. Wood, C. E., Jr.
A study of hybridization in *Downingia* (Campanulaceae).
J. Arnold Arbor., 1961, **42**: 219-62, bibl, 10, illus.
The species concerned are *bicornuta*, *concolor*, *cuspidata*, *elegans*, *insignis*, *ornatissima*, *picta*, *pulchella* and *pusilla*. Vigorous, fertile hybrids resulted from *bicornuta* × *picta*, and chlorotic, but fertile, hybrids from *insignis* × *pulchella*.

6711. Brown, H. S.
Differential chiasma frequencies in self-pollinating and cross-pollinating species of the genus *Gilia*.
Diss. Abstr., 1961, **21**: 2864, being *L.C. Card No. Mic.* 60-4916 of 111 pp.

6712. Glek, I. H. O., and Wagner, W.
Distribution of boron in *Oenothera* species. Histochemistry of plants. [German ?]
Ber. dtsch. bot. Ges., 1960, **73**: 463-70, bibl. 13, from abstr. in *J. Sci. Food Agric.*, 1961, **12**: i-267.
The highest concentration of B was found in the pistils, the growing points and the leaves, and the lowest in the pollen, fruits and seeds. On a dry weight basis the accumulation of B in the plants was 10–20 times the soil concentration. The concentration decreased via the stamens to the pollen, but increased via the pistils to the stigmata. The dry-weight B concentration in the pollen was 8–9%, or about 50% of that found in the stigmata. Fertilization was not accompanied by extra transport of B to the stigmata.

6713. Piringer, A. A., and Cathey, H. M.
Effect of photoperiod, kind of supplemental light and temperature on the growth and flowering of petunia plants.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 649-60, bibl. 14, illus.
Six petunia varieties were used in experiments involving 6 photoperiods ranging from 8 to 16 hours, two kinds of supplementary light (incandescent and fluorescent) and 4 night temperatures (50°, 60°, 70° and 80° F.). The results confirmed that petunia is a non-obligate long-day plant, the plants receiving the longest photoperiod flowering

first, and those receiving the shortest photoperiod flowering later and less prolifically. Single stems with long internodes were characteristic of plants grown in long photoperiods, and the formation of basal branches and short internodes of plants grown in short photoperiods. Incandescent light was more effective than fluorescent light in promoting longer internodes and earlier flowering. Higher temperatures also resulted in longer internodes and earlier flowering, and at low temperature (50° F.) some basal branching occurred even in plants grown under 16-hour photoperiods. Two varieties, which flowered relatively early and late, respectively, in 8-hour photoperiods, flowered early and simultaneously when grown in 16-hour photoperiods provided by incandescent light. In one other variety fasciation of the main stem was induced by prolonged growth in 8-hour photoperiods.—U.S.D.A., Beltsville, Md.

6714. Erbe, L. W.
A biosystematic study of the *Phlox cuspidata–Phlox drummondii* complex.
Diss. Abstr., 1961, **21**: 2447, being *L.C. Card No. Mic.* 60-6615 of 104 pp.

Chromosome counts, distribution, cross- and self-pollination and a taxonomic key.

6715. Harborne, J. B., and Sherratt, H. S. A.
Plant polyphenols. 3. Flavonoids in genotypes of *Primula sinensis*.
Biochem. J., 1961, **78**: 298-306, bibl. 37.

The flavonoids in the flowers of 43 genotypes are identified, and the biochemical effects of factors controlling co-pigmentation and anthocyanin concentration are discussed.

6716. Scurti, J. C., and Gallucci, M. M. R.
Su un mosaico della primula. (**A primula mosaic virus.**) [English summary 6 lines.]
Not. Mal. Piante, 1960, No. 53/54, pp. 131-8, bibl. 22, illus.

Symptoms and histological and cytological effects of a disease observed on *Primula obconica*, *P. malacoides* and *P. sinensis*.

6717. Crawford, R. M. M.
The photoperiodic reaction in relation to development in *Salvia splendens*.
Ann. Bot., Lond., 1961, **25**: 78-84, bibl. 10, illus.

Salvia splendens var. Feu de la Saint Jean was found to be a long-day plant. The maximal length of day in which the plant would not come into flower was, however, exceptionally low (7 hours). In all other aspects of its photoperiodic reaction the plant was typical of the long-day class. The plant showed a precocious sensitivity to the photoinduction of flowering. When induction was started at germination, flower induction was completed after giving 15–20 long days. The morphological changes leading to the laying down of the first flower primordia took place a considerable time (15 days) after the completion of flower induction. [From author's abstract.]—Univ. Liège, Belgium.

6718. Maatsch, R., and Rünger, W.
Saatzeit und Entwicklung von Anthirrhinum. (**Time of sowing and development of snapdragon.**) [English and French summaries 8 lines each].
Gartenbauwiss., 1960, **25**: 231-5, bibl. 4, illus.

Navajo and Delworth-Supreme were sown at intervals of 15 days from February until August. The time taken to flowering decreased throughout this period until May, while the inhibition of lateral shoot formation became more pronounced. With sowings from May until 15 July both the time required for development and the degree of lateral shoot formation remained fairly constant. Plants sown in August took a very long time to flower.—Inst. ZierpflBau, tech. Hochsch., Hannover.

6719. Brown, H. D.
Conductivity as a measure of electrolyte content in nectar.
Bot. Gaz., 1961, **122**: 314-15, bibl. 4, illus.

Measurements of conductivity and the refractive index in nectar from buds and flowers of *Antirrhinum majus* indicated that the concentrations of electrolytes and of sugars increased with the age of the flower.—Loyala Univ., New Orleans, La.

6720. Gill, D. L.
A stem and branch rot of snapdragon.
Plant Dis. Reptr, 1960, **44**: 946-7, bibl. 11.

Caused by *Phytophthora parasitica*, this disease of snapdragons is new to the United States. Steam sterilization of the soil appears to give control.

6721. El-Nadi, A.-F., and Sirry, G.
Effect of gamma radiation on germination of some annual seeds.
Agric. Res. Rev., Cairo, 1959 (issued 1960), **37**: 439-42, bibl. 5.

Low levels of irradiation increased the germination percentage of stock (*Matthiola incana*) seeds, the optimum being 109 and 215 r; higher dosages reduced viability progressively. The effect on pansy seed was similar except that germination remained high even at the top level of 1,344 r. Delphinium seed proved very sensitive to irradiation, as little as 109 r reducing germination and 215 r being lethal.

6722. Heiser, C. B., Jr., and Smith, D. M.
The origin of *Helianthus multiflorus*.
Amer. J. Bot., 1960, **47**: 860-5, bibl. 18, illus.

An abstract of this paper was noted in *H.A.*, 30: 602.

Bulbs, tubers, etc.

(*See also* 6565, 6666, 6667, 6950, 7247, 7264.)

6723. Riley, H. P., and Bryant, T. R.
The separation of nine species of the Iridaceae by paper chromatography.
Amer. J. Bot., 1961, **48**: 133-7, bibl. 7.

Root-tip chromatograms of 6 species of *Watsonia* and one each of *Dietes*, *Babiana* and *Sparaxis* showed striking generic differences and some strong specific relationships.—Univ. Ky, Lexington.

6724. Scurti, J. C.
Difesa dalle malattie crittogamiche dei bulbi. **(Control of fungal diseases of bulbs.)**
Not. Mal. Piante, 1960, No. 53/54, pp. 103-20, bibl. 78.

A review, covering hyacinth, tulip, lily, narcissus, gladiolus, iris and crocus.

6725. Mann, L. K.
Bulb organization in *Allium*: some species of the section *Molium*.
Amer. J. Bot., 1960, **47**: 765-71, bibl. 10, illus.

Allium neapolitanum, *A. erdelii*, *A. hirsutum*, *A. subhirsutum*, *A. roseum* and *A. zebdanense*. [See also *H.A.*, 30: 2606 for a study of inflorescences.]

6726. Aragaki, M., and Ishii, M.
A spadix rot of *Anthurium* in Hawaii.
Plant Dis. Reptr, 1960, **44**: 865-7, bibl. 8, illus.

The causal organism was *Colletotrichum gloeosporioides*. Excellent control was obtained by the application of maneb (2 lb. 70% w.p.), dodine (1 lb. 65% w.p.) or Dyrene (1 lb. 50% w.p.), all per 100 gal., and by hot water treatment of the cut flowers at 46-48° C. for 15 or 30 min.—Hawaii agric. Exp. Stat., Honolulu.

6727. Evison, J. R. B., and Poulton, A. L.
Winter-flowering begonias.
J. roy. hort. Soc., 1961, **86**: 176-9.

Notes on culture and tabulated data on 22 varieties.

6728. van Onsem, J., and Haegeman, J.
Essais concernant l'influence des gibberellines sur la croissance et la tuberisation du *Begonia tuberhybrida*. **(Trials on the effect of gibberellins on growth and tuber weight in *Begonia tuberhybrida*.)**
Rev. Agric., Brux., 1961, **14**: 263-72, bibl. 4, illus.

In trials in 1960 2 sprays were applied at the beginning of the summer to Maxima blanc, 3 at intervals during the season to Double Jaune and 2 at the beginning of the summer and a third 2 weeks before harvesting to Mme Hélène Harms. The total rates of application ranged from 0·2 to 1·96 g. gibberellic acid per plant and the concentrations from 10 to 50 p.p.m. GA increased stem length, the length of the longest stems in the 3 treated plots of Double Jaune being 26·93, 26·62 and 23·72 cm., respectively, compared with 20·07 in the control. It increased the mean weight of tubers in both plots of Mme Hélène Harms and in 1 of the 3 plots of Double Jaune, but reduced it in both plots of Maxima blanc.—Stat. Rech. État Amél. Plantes ornem.

6729. Wilson, J. Y.
Chiasma frequency in the two sex mother-cells of a hermaphrodite.
Reprint from *Chromosoma*, 1960, **11**: 433-40, bibl. 16.

In the bluebell, *Endymion nonscriptus*.

6730. Schupper, J. F. B. M.
Onderzoek naar de kwantitatieve opbrengsten van krokussen in Westfriesland en Breezand. **(Studies on quantitative yields of crocuses in West Friesland and Breezand.)**
Overz. Landb.-Econ. Inst., 's Gravenhage, **165**, 1960, pp. 11.

Figures given for yields per bulb bed for 1957-58 and 1958–59, and tabulated details of cultural measures.

6731. Slootweg, A. F. G.
Aaltjesziekten in crocussen. **(Nematode infection of crocuses.)**
Weekbl. BloembollCult., 1961, **71**: 934, 938.

Crocuses infected with *Ditylenchus destructor* or *Aphelenchoides subtenuis* may be disinfected by hot-water treatment. The following factors were shown to affect the success of the treatment: cleaned corms should be treated 6–8 days after lifting for 3 hours at 43½° C., and non-cleaned corms at the same temperature for 4 hours; the recommended storage temperatures before treatment are 23° C. or 25½° C., and after treatment 17° C. or 23° C., according to variety and the type of corm desired; an organic mercuric compound should be added to the hot-water bath to control *Fusarium oxysporum*; the corms should be dried as quickly as possible after treatment; hot-water-treated crocuses should be planted out as early as possible in unmanured soil. Soil treatment for nematode control is also necessary.—Lab. BloembollOnderz., Lisse.

6732. Neuray, G.
Étude des corrélations entre les différentes phases de la croissance et du développement du *Cyclamen persicum* Mill. **(A study of correlations between the different growth and development phases in *Cyclamen persicum*.)** [English and German summaries 12 lines each.]
Bull. Inst. agron. Gembloux., 1960, (hors Sér.) **1**: 374-81, illus.

The coefficients of correlation established in these studies are reliable for predicting, as early as the completion of germination, the future development of individual cyclamen plants, and should therefore be of considerable use in selection.

6733. Maatsch, R., and Seyffert, W.
Über eine Methode zur Auswertung von Herkunfts-Vergleichsprüfungen bei Cyclamen. **(A method of evaluating variety trials of cyclamen.)** [English and French summaries 7 lines each.]
Gartenbauwiss., 1960, **25**: 333-48, bibl. 20, illus.

A new basis is proposed for the evaluation of variety trials. The six characters chosen are growth, flower size, flower number, leaf markings, flower form and flower colour; the last 3 characters together account for 60% of the points awarded.

6734. Lindemann, A., and Buhr, R.
Versuche mit Cofuna bei der Cyclamenkultur. **(Trials with Cofuna in cyclamen growing.)**
Gartenwelt, 1961, **61**: 163-4.

The addition of the proprietary organic manure Cofuna to the potting soil improved the flowering performance of several cyclamen varieties. The optimum supplement was between 5 and 10% of Cofuna.—Hamburg. GartenbVersuchsanst., Fünfhausen.

6735. Garavini, C.
L'acaro pallido del ciclamino. **(Cyclamen mite.)**
Inf. fitopat., 1961, **11**: 57-9, illus.

Notes are given on the morphology and common host plants of *Steneotarsonemus pallidus*, which has recently been observed in Italy for the first time. Control is obtained by dipping infested plants in a nicotine solution for 15–25 minutes at 43° C. and by treatment with Kelthane, Thimet and, for the leaves only, endrin.

6736. Davis, E. L.
Medullary bundles in the genus *Dahlia* and their possible origin.
Amer. J. Bot., 1961, **48**: 108-13, bibl. 11, illus.

In *D. lehmanni*, *D. scapigera* and *D. coccinea*.

6737. Schupper, J. F. B. M., and van Leyen, H.
Onderzoek naar de kwantitatieve opbrengsten van gladiolen in Westfriesland. **(Studies on the quantitative yields of gladiolus in West Friesland.)**
Overz. Landb.-Econ. Inst., 's Gravenhage, **167**, 1960, pp. 12.

Figures are given for yields in 1959 of corms and cormels per bulb bed given by many varieties. These are amplified by tabulated data on certain cultural measures carried out on each holding.

6738. Magie, R. O.
Breeding gladiolus for Florida.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 375-8, bibl. 3.

Breeding work for the past 11 years is reviewed. High resistance or field immunity to all of the important diseases except *Stromatinia gladioli* have been found in certain seedlings. One variety, Florida Pink [see *H.A.*, 30: 4198] has been released. —Gulf Coast Exp. Stat., Bradenton.

6739. Schenk, P. K.
Warmwaterbehandeling van gladiolekralen. **(Hot water treatment of gladiolus cormels.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1961, **24**: 173-85, 197, 209-10, bibl. 20.

Also reported in *H.A.*, 31: 2941.

6740. Halevy, A. H.
The influence of progressive increase in soil moisture tension on growth and water balance of gladiolus leaves and the development of physiological indicators for irrigation.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 620-30, bibl. 32.

In order to find a physiological indicator for irrigation requirements the responses of the gladiolus plant to the decrease in soil moisture from field capacity to the ultimate drying out of plants were studied. The following factors were measured daily in two experimental series: transpiration, leaf water content, stomatal aperture, water saturation deficit, osmotic values and leaf elongation. The response pattern of each factor to progressive increase in soil moisture stress is described and discussed, and its value as a guide for irrigation is indicated. Water content, water saturation deficit and stomatal aperture showed a marked change when soil reached its critical moisture tension. The most easily detected factor is stomatal aperture, determined by the infiltration method. A practical method for determining the right time for irrigation of gladiolus plants grown for corm yield is suggested. [Author's summary.]—Hebrew Univ., Fac. Agric., Rehovot, Israel.

6741. Halevy, A. H., and Monselise, S. P.
Influence of flower removal on yields of corms and cormels and successive flower quality of gladiolus var. Sans souci.
Reprint from *Gladiolus Yearb.*, 1961, **36**: 71-6, bibl. 4.

Plants from which flower spikes were cut leaving 4 leaves per plant, produced corms weighing about 30% less than those of plants with intact leaves. Corm yield was not affected by removing the inflorescence when it first appeared or at the start of flowering, but yields of cormels were doubled compared with plants allowed to flower. Corms of similar size, produced after different flower removal treatments, showed no differences in flower quality or corm yield in a subsequent growing season. Measurements of growth curves showed that most corm, and all cormel, development occurred during a 5-week period starting at the end of flowering.—Hebrew Univ., Rehovot, Israel.

6742. Detroux, L., and Neuray, G.
Essais de desherbage selectif du glaieul. **(Selective weed control trials in gladioli.)**
Meded. LandbHogesch. Gent, 1959, **24**(3/4): 881-92, bibl. 3, illus.

Results are given of pre- and post-emergence applications of herbicides in gladioli. The best and most lasting weed control was given by pre-emergence applications of simazine at 2 kg./ha., neburon at 4·4 kg./ha. and monuron at 1·6 kg./ha. in that order, all of which gave excellent control of annual weeds but were less effective against perennials.—From *Weed Abstr.*, **10**, No. 474.

6743. Chiapparini, L.
Risultati di alcune prove di diserbo chimico selettivo in pre e post emergenza delle tuberose e dei gladioli da fiore. **(Results of some pre- and post-emergence selective weed control trials in tuberose and gladiolus flower crops.)** [English summary 1 p.]
Not. Mal. Piante, 1960, No. 53/54, pp. 155-73, bibl. 4, illus.

Of the new pre-emergence herbicides tested 80% diuron at 2·8 kg. a.i. per ha. gave the best results a month after application, viz. 65–80% reduction of weeds compared with 75–85% reduction with the standard ATA + CIPC mixture at 2·0 + 1·5 kg. a.i. per ha. The residual effect was longer on clay than on lighter soils. Post-emergence application of 40% dinoseb at 1·6 kg. a.i. per ha. was less effective than the standard treatment. None of the products affected the crops adversely.—Osserv. Mal. Piante, Milano.

6744. Brierley, P., and Smith, F. F.
Transmission of tobacco ringspot virus on tools during harvesting flowers and corms of gladiolus.
Plant Dis. Reptr, 1960, **44**: 463-4, bibl. 6.

The tobacco ringspot virus was transmitted from gladiolus to gladiolus on tools used in harvesting flowers (1·8%) and in cutting tops preparatory to harvesting corms (10%, 1·9%). This virus was symptomless in the gladiolus cultivars and seedlings used in these tests. [Authors' abstract.]—U.S.D.A., Beltsville, Md.

6745. Nichols, L. P.
Corm and soil treatment for the control of bacterial scab of gladiolus.
Plant Dis. Reptr, 1960, **44:** 417-18, bibl. 3.

Gladiolus corms soaked for 2 hours in the organic mercury product Emmi (1 cup/25 gal. of water) and planted in furrows treated with 5% granular heptachlor at 63·6 g. per 100 ft. were delayed in shoot emergence. In all the treatments involving mercurial fungicides there was a delay of up to 2 weeks in flowering. The average weight per harvested corm was highest in the Emmi/heptachlor treatment, and was only slightly less when the corms had been dusted with Delsan A-D (60% thiram, 15% dieldrin). Calomel dipping gave the lightest corms and failed to control scab (*Pseudomonas marginata*), as did Emmi alone, or soaking in New Improved Ceresan (5% ethyl mercury phosphate) at 1 tablespoonful/gal. for 15 min. The percentage of new corms affected by scab was lowest (36) in the case of Delsan, and the only other treatment giving appreciable control (46% affected) was Emmi plus heptachlor.—Pa St. Univ., University Park.

6746. Magie, R. O.
Controlling gladiolus *Botrytis* bud rot with ozone gas.
Proc. Fla St. hort. Soc., 1960, 1961, **73:** 373-5, bibl. 3.

Spikes artificially infected with *B. gladiolorum* were placed in a storage room or a cabinet made of polyvinyl sheeting, in which ozone was generated for periods of ½ to 24 hours by an "Aire-Zone" unit. When an inoculation method simulating natural means of depositing conidia from the air was used, *Botrytis* spots on the petals were reduced to 22–37% of those on untreated spikes by a ½-hour exposure to ozone and to 0–16% by a 4-hour exposure, while the number of spots on the stems and bud sheaths were reduced to 3% of those on the controls. Exposures of 2 to 8 hours did not affect flower quality.—Gulf Coast Exp. Stat., Bradenton.

6747. Baldacci, E., and Sganzerla, M.
Accorgimenti tecnico-agronomici nella lotta contro la *Botrytis* ed il *Fusarium* dei gladioli. **(Technico-agronomic measures for the control of *Botrytis* and *Fusarium* in gladiolus.)**
Not. Mal. Piante, 1960, No. 53/54, pp. 147-54, bibl. 4.

Investigations showed that *Botrytis gladiolorum* (leaf spot) and *Fusarium oxysporum* f. *gladioli* (fusarium rot) infection can be minimized by early planting, choice of suitable soil (preferably sandy), light irrigation, early lifting in suitable weather, thorough drying and proper storage.—Osserv. Mal. Piante, Milano.

6748. Liemburg, J.
Behandeling van hyacinten leverbaar. **(Treatment of hyacinths ready for sale.)**
Weekbl. BloembollCult., 1961, **71**: 954.

Temperature treatments for hyacinths to promote flowering at periods between Christmas and April.

6749. v.d. H—, —.
Het "van de wortel gaan" bij hyacinthen. **(Root rot of hyacinths.)**
Weekbl. BloembollCult., 1961, **71**: 957.

Root rot of hyacinths, caused by *Fusarium culmorum*, can be controlled by soil injections of chloro-bromopropene. The rate recommended by the

Plantenziektenkundige Dienst (Wageningen) is ¾ l. CBP plus 2 l. formalin per RR [14·19 sq. m.] or 1 l. CBP/RR. The state Advisory Service and Shell recommend ¾ l. CBP without formalin.

6750. Lehoczky, J.
The rust disease of hyacinth plants. [English, with French and German summaries ¼ p. each.]
Acta agron. hung., 1960, **10**: 467-79, bibl. 9, illus.

The life-history of the pathogen, *Uromyces scillarum*, and the development of the disease are described. Removal of infected leaves and stems below the sori as soon as these appeared was only partially successful in controlling the spread of the fungus, and steeping the bulbs in 2% Higosan for 1½ hours delayed but did not prevent its development. Soil disinfection and crop rotation are suggested.—Plant. Quar. Lab., Budapest.

6751. (Beijer, J. J.)
Preparatie geremde irissen sterk vereenvoudigd. **(The preparation of [Dutch] irises for delayed flowering is simplified.)**
Weekbl. BloembollCult., 1961, **71**: 972, 977.

The following recommendations on the treatment of bulbs to be exported to the southern hemisphere are based on research at the Laboratory for Bulb Research at Lisse: the size of bulb which can be treated varies according to the variety used, but only round bulbs which have not flowered should be considered; the bulbs should be stored at 30° C. as soon as possible after lifting and for the first 3 weeks ventilation 10 times per hour is necessary; after storage at 30° C. the bulbs should be kept at 17° C. for 4 or 6 weeks before planting. Iris varieties which can be treated in this way are listed.

6752. Morris, C. J., Thompson, J. F., and others.
The isolation of γ-L-glutamyl-β-aminoisobutyric acid from iris bulbs.
***m*-Carboxyphenyl-L-alanine: a dicarboxylic aromatic amino acid from iris bulbs.**
J. biol. Chem., 1961, **236**: 1181-2, bibl. 14, and 1183-5, bibl. 16.

The first paper deals with the isolation, properties and identification of a new peptide from Wedgewood iris bulbs, which accounts for 15% of the non-protein amino N. The second paper reports on a new amino acid from the same source.—U.S.D.A., Ithaca, N.Y., and Beltsville, Md.

6753. Kohl, H. C., Jr., Lunt, O. R., and Kofranek, A. M.
Response of *Lilium longiflorum* var. Croft to high salt and boron concentrations.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 644-8, bibl. 9.

Croft lilies are relatively tolerant of high boron concentrations or saline conditions caused by calcium and sodium chlorides during the preforcing period. Evidence is presented to show that little mineral accumulation occurs during this period. The plants are relatively sensitive to boron levels prevailing during the forcing period. Boron injury is expressed as tip necrosis of the foliage. Croft lilies are relatively sensitive to sodium and calcium chlorides during the forcing period. Injury occurs as leaf necrosis, reduced height and flower blasting. Leaf tissue analyses are included. [Authors' summary.]—Univ. Calif., Los Angeles.

6754. Maatsch, R., and Herklotz, A.
Ein Beitrag zum Treiben von Maiglöckchen. **(A report on forcing lily-of-the-valley.)**
Gartenwelt, 1961, **61**: 197-8, bibl. 3.

Storage of lily-of-the-valley pips for 4 weeks was satisfactory in a commercial cold store, but after storage in soil in a frame flowering was generally slower and fewer leaves were produced. With 10 weeks' storage both methods gave similar results. —Inst. ZierpflB., tech. Hochsch., Hannover.

6755. Wallace, G. L'E.
The daffodil trials at Wisley.
Comm. Gr. 1961, No. 3412, pp. 1239-41.

A survey of 25 years' records summarizing the number of flowers per bulb produced by some award winners in Divisions I, II and III of the official Classification.

6756. Battersby, A. R., and others.
Biosynthesis in the Amaryllidaceae: incorporation of norbelladine into lycorine and norpluvine.
Barton, D. H. R., and others.
The biosynthesis of Amaryllidaceae alkaloids.
Proc. Chem. Soc., Lond., July 1961, pp. 243-4, bibl. 6, and pp. 254-5, bibl. 3.

Studies on the biosynthesis of alkaloids in narcissi and snowdrops.

6757. Wood, J., and Shepherd, F. W.
Herbicides for daffodils and tulips.
N.A.A.S. quart. Rev., 1961, **12**: 166-70, bibl. 5.

A brief outline is given of the development of chemical weed control in narcissus and tulip beds at Kirton, Lincolnshire, and Rosewarne, Cornwall. It has been found that PCP, applied pre-emergence at up to 8 lb./acre, followed by chlorpropham, applied pre-emergence or immediately post-emergence at 4 lb./acre, gives good control of annual weeds from autumn until the following May or June. [See also *H.A.*, 31: 5050.]

6758. Wood, J.
Tulip bulb production.
Agriculture, Lond., 1961, **68**: 18-20, bibl. 3, illus.

Varieties are discussed, together with the control of tulip fire, the mechanical planting and lifting of bulbs and suitable weed-killers, which include pentachlorophenol emulsion and chlorpropham (CIPC) applied as sprays at the rate of 100 gal./acre.—Kirton exp. Husbry Fm, Boston, Lincs.

6759. Ito, H., Kato, T., and Toyoda, T.
Metabolism of tulip bulbs as related to thermoperiodicity. [Japanese, with English summary 1⅓ p.]
J. hort. Ass. Japan, 1960, **29**: 323-30, bibl. 10.

Data are presented on the N and carbohydrate metabolism and the activity of auxins and inhibitors throughout the life cycle of bulbs kept at room temperature and of chilled bulbs. The growth of bulbs in sandy soil is compared with that of bulbs grown in a paddy field.

6760. Valášková, E.
Příspěvek ke studiu genetické resistence tulipánů k *Botrytis tulipae* (Lib.) Lind. (**A contribution to a study of genetic resistance in tulips to *Botrytis tulipae*.**) [English, Russian and German summaries 1 p. each.]
Acta Průhoniciana, 1960, No. 1, pp. 29-42, bibl. 10.

Isolates of *Botrytis tulipae* from 8 sources were similar in their physiological properties and virulence both *in vitro* and *in vivo*, the fungus showing considerable adaptability and vigour in all cases. In tests on the rapidity of the spread of the disease with artificially infected tulips it was found that: (1) the plants were most susceptible during flowering; (2) the older tissues were more susceptible than the younger; (3) high humidity and the slightest injury, such as the removal of the wax from the leaves, increased susceptibility; and (4) with advancing age the vitality of the conidia declined. Of 15 tulip species inoculated with a Dutch isolate from Baarn none was resistant, although the disease developed more slowly in *Tulipa biflora*, *T. tarda* and *T. sylvestris* than in the others. This difference in susceptibility is, however, considered to be too small to be of practical value and the need for testing further species is stressed.

6761. Valášková, E.
Moření tulipánových cibulí. (**Disinfection of tulip bulbs.**) [English, Russian and German summaries ½ p. each.]
Věd. Prác výzk. Úst. okrasn. Zahrad, ČSAZV, v Průhonicích, 1961, No. 1, pp. 187-204, bibl. 31.

Experiments were conducted under laboratory, field and commercial conditions on the control of *Botrytis tulipae* on tulips by bulb treatment with mercury compounds, formalin, organic fungicides and some inorganics. The most satisfactory control was obtained with the mercury compounds and with silver nitrate and Chinosol. Although some of the mercury compounds reduced yields, organic types were generally better than inorganic and some of them, such as Panogen and Germisan, had a stimulating effect. The thiocarbamates zineb, Novozir and Cosanil were less toxic to the pathogen, but they produced the greatest total number and highest percentage of large bulbs. Disinfectants based on heavy metals (Hg, Ag) were most effective when applied immediately before planting out, whereas thiocarbamates and Chinosol gave the best results when used immediately after harvest.

6762. Basteleus, R.
Le *Zantedeschia* (*Richardia*) à spathe jaune. (**The yellow-spathed *Zantedeschia* (*Richardia*).**)
Bull. hort., Liège, 1961, **16**: 171-3, bibl. 1. illus.

History of cultivation and notes on breeding, with special reference to *Z. elliottiana*.

Lawns and sports turf.

(*See also* 5713, 7288.)

6763. Campbell, J. S., and Forster, R. H.
Lawn grasses in Trinidad. [Spanish summary ¼ p.]
Proc. Carib. Reg. Amer. Soc. hort. Sci., 1960, 1960, 4(8th annu. Mtg): 78-84, bibl. 2.

The climate and soil in the island and the establishment of lawns are discussed and grass species under trial are listed. The most promising of these species for general purposes are Java grass (*Polytrias praemorsa*), Bahia grass (*Paspalum notatum*) and Manila grass (*Zoysia matrella*). Bahama grass (*Cynodon dactylon*) is suitable for cricket pitches and Cuban lawn grass (*Opizia stolonifera*) for golf greens.—Imp. Coll. trop. Agric., Trinidad.

6764. Roberts, E. C., and Everson, L. E.
Lawn seed or grass seed—which do you buy?
Ia Fm Sci., 1961, **15**(9): 5-8, illus.

Notes on the main commercial species and suitable mixtures for lawns and rough turf in Iowa.

6765. Jung, J.
Ein neuer Stickstoffdünger mit langanhaltender Wirkung. (**A new nitrogen fertilizer with a persistent action.**)
Gartenwelt, 1961, **61**: 126-8, illus.

Floranid is an organic fertilizer containing 90% of its N in a slowly-available form, and 10% in a quick-acting form. It has given better results than nitrate of lime for lawn fertilization, and better results than nitro-chalk for *Primula obconica*.

6766. Musser, H. B.
Fertilizer use and weed control.
Proc. Midw. Reg. Turf Conf. 1960, pp. 15-18.

Observations are made on the timing of fertilizer applications to turf, in relation to the control of weeds, especially *Poa annua*, *Stellaria media* and *Digitaria* spp.—Pa St. Univ., University Park.—*Weed Abstr.*, **10**, No. 854,

6767. JUSKA, F. V.

Pre-emergence herbicides for crabgrass control and their effects on germination of turfgrass species.

Weeds, 1961, **9**: 137-44, bibl. 3.

In glasshouse experiments with a number of pre-emergence herbicides used for crabgrass control, fenac, Arsenic Complex + 7% N and chlordane remained toxic to Colonial bentgrass (*Agrostis tenuis*) for 3 months. Chlordane inhibited the germination of Merion Kentucky bluegrass (*Poa pratensis*) more than that of annual bluegrass. In the field all pre-emergence herbicides, with the exception of diphenylacetonitrile and disodium monomethyl arsonate, reduced the germination of 4 turfgrass species and affected their growth. Vegetatively propagated grasses resisted the herbicides better than did sown grasses. In an established turf pre-emergence treatments with calcium arsenate and Arsenic Complex + 7% N effectively controlled crabgrass, but the latter injured the turf.—U.S.D.A., Beltsville, Md.—From *Weed Abstr.*, **10**, No. 479.

6768. GALLAGHER, J. E., AND OTTEN, R. J.

New organic arsenical materials for pre-emergence crabgrass control.

Hormolog, 1961, **3**(1): 11-13.

In trials, in which the pre-emergence control of *Digitaria* spp. and the tolerance of newly sown and established seedling turf grasses were assessed, calcium propyl arsonate at 0·75 and 1·5 lb. per 1,000 sq. ft. gave over 80% control of *Digitaria* spp. and caused little injury to the turf grasses. Zytron at 15 lb./acre, and especially Dacthal at 10 lb./acre, gave very good pre-emergence control of crabgrass, but prevented the growth of turf grasses sown after treatment, though they had little effect on established turf grasses.—Amchem Products Inc., Ambler, Pa.—From *Weed Abstr.*, **10**, No. 856.

6769. ROBERTS, E. C., AND PELLETT, H. M.

Yes, you can control crabgrass.

Ia Fm Sci., 1961, **15**(10): 5-7, illus.

Crabgrass (*Digitaria* spp. and *Eleusine indica*) can be controlled in lawns by proper cultural practices, combined with applications of PMA (phenyl mercuric acetate), DMA (disodium methyl arsonate) or AMA (amine or ammonium methyl arsonate) whenever crabgrass seedlings appear in the lawns. Zytron or Dacthal, applied in March or early April, have also given good control.

6770. FRANS, R. E.

Crabgrass control in lawns.

Arkans. Fm Sci., 1961, **10**(1): 7, illus.

Disodium monomethyl arsonate (DMA) and dodecyl and octyl ammonium monomethyl arsonate (AMA) were effective in controlling crabgrass (*Digitaria sanguinalis* and *D. ischaemum*) and wild paspalum (*P. laeve*) in bermuda grass lawns. Two applications in June of 2 oz./1,000 sq. ft. DMA liquid or 1·3 oz./1,000 sq. ft. AMA powder gave good control without damage to the lawn.

6771. DANIEL, W. H.

Solving the *Poa annua* problem.

Proc. Midw. Reg. Turf Conf. 1960, pp. 23-7.

Recommendations, based on trials at Purdue and other Experiment Stations, are given for the use of calcium arsenite for the control of *Poa annua* in lawns, golf fairways and putting greens, using a standard rate of treatment of 12 lb./1,000 sq. ft. Trial results with other herbicides for controlling *Poa annua* are reviewed briefly.—Purdue Univ., Lafayette, Ind.—*Weed Abstr.*, **10**, No. 855.

6772. N.S.W. DEP. AGRIC., BIOLOGY BRANCH.

Diseases of turf.

Agric. Gaz. N.S.W., 1961, **72**: 92-5, illus.

Brown patch, mainly due to *Rhizoctonia solani*, may be controlled by mercuric chloride and calomel or the former alone. Dollar spot, *Sclerotinia homoeocarpa*, responds to the same treatment or to cadmium-containing organic fungicides. For leaf spot diseases, e.g. *Helminthosporium cynodontis*, zineb and phenyl mercury compounds are recommended.

6773. LUKENS, R. J., AND STODDARD, E. M.

Control of stripe smut on *Poa pratensis* with nabam.

Plant Dis. Reptr, 1960, **44**: 672.

The incidence of *Ustilago striiformis* in Kentucky bluegrass was greatly reduced by 22% nabam diluted at 1:400 or 1:600 applied either in the spring or autumn at 1 pt. per sq. ft.—Conn. agric. Exp. Stat., New Haven.

Foliage and succulent plants.

(*See also* 6565, 6670.)

6774. NICHOLLS, C. A., SMITH, C. N., AND BROOKE, D. L.

A survey of the Florida foliage plant industry.

Bull. Univ. Fla agric. Exp. Stats **615**, 1959, pp. 30, illus.

Estimated acreage and marketing aspects.

6775. CIBES, H., AND SAMUELS, G.

Mineral-deficiency symptoms displayed by *Dracaena godseffiana* and *Dracaena sanderiana* plants grown under controlled conditions. [Spanish summary 2 pp.]

Tech. Pap. P.R. agric. Exp. Stat., Río Piedras, **29**, 1960, pp. 28, bibl. 5, illus.

Symptoms of deficiency of the 7 major elements and Mn and B are described and illustrated. N and Fe deficiencies had the most serious effects in both species as regards the production of shoots and foliage. *D. sanderiana* showed chlorosis due to P deficiency but *D. godseffiana* did not.

6776. Joe, B.
Ferns cultivated in California.
Lasca Leaves, 1961, **11**: 8-14, illus.

Blechnum and *Ctenitis* species.

6777. Rünger, W.
Über den Einfluss der Stickstoffernährung und der Temperatur während Langtag- und Kurztagperioden auf die Blütenbildung von *Kalanchoe blossfeldiana*. **(On the influence of nitrogen nutrition and temperature during long- and short-day periods on flower formation in *Kalanchoe blossfeldiana*.)**
Planta, 1961, **56**: 517-29, bibl. 14.

Applying N to N-starved plants before short-day treatments inhibited flower formation at medium temperatures (20° and 25° C.), but at 15° and at 30° C. this inhibiting effect did not occur. N applied during short-day treatment promoted flower formation, especially at 20–25° C. When N was applied after short-day treatment its effect on flower formation was slight. [See also *H.A.*, 29: 1730 and 30: 1044.]—Inst. ZierpflBau. tech. Hochsch., Hannover.

6778. Uhl, C. H.
The chromosomes of the Sempervivoideae (Crassulaceae).
Amer. J. Bot., 1961, **48**: 114-23, bibl. 17, illus.

Chromosome numbers in species of *Sempervivum*, *Aichryson*, *Aeonium*, *Greenovia* and *Monanthes*, and possible relationships with other genera of the Crassulaceae.

Orchids.

6779. The American Orchid Society, The British Orchid Growers' Association, and The Royal Horticultural society.
Proceedings of the Third World Orchid Conference, London, 1960, R.H.S., London, 1960, pp. 442, bibls, illus, 42s. or $6·00.

The Proceedings of this important international conference have been published with admirable promptness by the Royal Horticultural Society. Papers presented by specialists from all over the world cover a range of subjects that will hold interest for both commercial and amateur growers as well as for botanists and plant breeders. For the amateur there are papers on growing orchids in the living room, in a cellar with fluorescent lighting and out of doors in a semi-tropical climate, and notes on some devices for providing a suitable environment in the greenhouse. The commercial grower will find much valuable information on the culture of the various orchid genera, the raising of seedlings, types of potting media, nutrition, greenhouse construction and trade problems. In addition there are contributions on the judging of various types of orchid, breeding, taxonomy, nomenclature and the ecology of orchids in their natural habitats. The meeting of the Commission on Classification, Nomenclature and Registration is reported in full. Some of the papers of special interest have been abstracted separately in this number.

6780. Sheehan, T. J.
Effects of nutrition and potting media on growth and flowering of certain epiphytic orchids.
Proc. 3rd World Orchid Conf., London, 1960, 1960, pp. 211-18, bibl. 15, and *Proc. Fla St. hort. Soc., 1960*, 1961, **73**: 352-4, bibl. 14.

Flowering plants of *Cattleya* Trimos and seedlings of a *Phalaenopsis* hybrid were used in experiments to compare 3 types of bark as potting media: Ease (cedar tan bark), Ivory (white fir bark) and Vita (white or red fir bark). In each case 3 levels each of N, P and K were applied at rates equivalent to 0, 50 and 100 lb. of N, P_2O_5 and K_2O per acre. With the cattleya plants in Ease and Ivory barks increasing the N level up to N_3 significantly increased the number of flowers per plant, but in Vita bark an increase above the N_2 level had no further effect on flowering, probably because the Vita bark decomposed more slowly than the other types. The type of bark alone and the levels of P and K had no effect on flowering. With the phalaenopsis seedlings growth (recorded as increase in leaf area) was significantly greater on the Ivory bark than on the other types; this was probably due to the greater ability of Ivory bark to retain moisture and nutrients. There was also a significant increase in leaf growth with each increment of N, except in the case of Vita bark where there was no further increase above the N_2 level. Levels of P and K had no effect on growth of the phalaenopsis seedlings.—Fla agric. Exp. Stat.

6781. Davidson, O. W.
Principles of orchid nutrition.
Proc. 3rd World Orchid Conf., London, 1960, 1960, pp. 224-33, illus.

Cattleya orchids were shown to tolerate a wide range of water quality. Plants supplied with moderately hard waters with a pH ranging from 5 to 9 made slightly better growth than plants given very soft waters. Waters with specific conductance values of between 25 and 75 × 10^{-5} Mhos are considered suitable for orchid culture. Water containing excessive B is unsuitable. Nutrient solution experiments showed that deficiences of N or P seriously limit the growth of cattleya orchids, but that small quantities of K, Ca and Mg present in the rooting medium can satisfy the plants' requirements for these elements. Special application of minor elements is unnecessary. Orchids grown in a bark medium were shown to require much higher rates of N fertilizer than those grown in osmunda or gravel culture, owing to the utilization of N by the wood-rotting fungi. Fertilizer formulae, evolved for the bark culture of orchids, are presented.—Rutgers St. Univ., New Brunswick, N.J.

6782. Helton, O. M.
Factors affecting flower productivity of cymbidiums.
Proc. 3rd World Orchid Conf., London, 1960, 1960, pp. 254-7, and reprinted in *Flor. Exch.*, 1961, **136**(12): 13, 28, 30.

Genetics, light, water, temperature, nutrition and potting media are briefly discussed. The higher the light intensity and the greater the water supply, consistent with root aeration, the better will the plants flower. Cymbidiums will initiate flower buds on new growth, and occasionally on old bulbs, when the night temperature falls below 60° F. during July to October.

6783. Wilcox, E. C.
Growth and flowering factors in cypripediums.
Proc. 3rd World Orchid Conf., London, 1960, 1960, pp. 346-52.

A chart showing the relationships between the factors affecting the growth and flowering of the green-leaved group of cypripediums is presented and discussed. To ensure flowering the plants must mature between 1 June and 31 December, and night temperatures during the spring must be between 55° and 60° F. In order to obtain mature plants at the right season, the grower must encourage a good root system and provide about 10,000 ft. candle hours of light per day, a day temperature of about 75°–90° F. and a moderate amount of available nutrients. Means of obtaining these requirements are suggested.

6784. Lindquist, B.
The raising of *Disa uniflora* seedlings in Gothenburg.
Proc. 3rd World Orchid Conf., London, 1960, 1960, pp. 207-11, illus.

A detailed account is given of a method, which has been used very successfully at the Botanic Garden in Gothenburg, for growing this orchid from seed up to the flowering stage. Flowers fertilized in August or September produce ripe seeds in November. The seeds should be sown immediately. They are sown under non-sterile conditions in sphagnum exposed to the open air. The seedbeds must be watered from below during the first 6 weeks to avoid disturbing the seeds, and thereafter the seedlings must be abundantly supplied with water. The first potting occurs after 4 months and repeated re-potting is necessary. The composition of the rooting medium is of great importance, the most successful mixture tested consisting (by volume) of $\frac{1}{2}$ sphagnum moss, $\frac{1}{16}$ sphagnum peat, $\frac{1}{16}$ mixed leaf compost and the rest sterilized sand. The type of sphagnum should be carefully chosen for its resistance to rapid decomposition. Winter temperature must be kept low, to 14° C. during the first winter and 6–10° C. during the second winter. About 50% of the plants will reach the flowering stage in 33 months.

6785. Hoyt, G. M.
The cultivation of miltonias.
Proc. 3rd World Orchid Conf., London, 1960, 1960, pp. 391-6, bibl. 1.

A method is described of growing miltonias in a medium consisting mainly of coarse fir bark. The bark is cheaper than osmunda and its use saves time during potting and results in less root damage. The pots are topped with a mixture of fine seedling bark, peat moss, pumice and cow manure. The seedlings are given supplementary fluorescent light to provide 16 hours a day in summer and 11 hours a day in mid-winter. The plants are fed with a 3–1–2 liquid fertilizer weekly during the summer and every 3 weeks during the winter. Plastic pots proved quite unsuitable for miltonias, although they have given good results with other orchid genera.

6786. Hunt, P. F.
Pleiones from Formosa.
Adey, R. M.
Varieties of *Pleione formosana*.
J. roy. hort. Soc., 1961, **86**: 168-71, bibl. 5, illus., and 171-5, illus.

The first article provides a botanical description of *P. formosana*, and the second describes 5 varieties and gives notes on their culture.

6787. Ciferri, R., Corte, A., and Corbetta, F.
Alcune virosi e le presunte batteriosi delle orchidee a Pavia. **(Some virus diseases and supposed bacterial diseases of orchids at Pavia.)** [English summary 10 lines.]
Not. Mal. Piante, 1960, No. 53/54, pp. 175-87, bibl. 16, illus.

Notes are given on virus diseases of orchids, some formerly attributed to bacteria, which have been found in the Botanic Gardens of Pavia University and in commercial crops in Lombardy and Liguria. Suggestions on control are included.

Roses.

(*See also* 5655, 6098, 6669, 6670, 6675, 6806, 7264.)

6788. National Rose Society of Great Britain.
The rose annual 1961.
National Rose Society, 1961, 8 × $5\frac{1}{2}$ in., pp. 174, illus.

Once again a mass of information about roses is presented for enthusiasts. Recent research on roses is summarized, and a further report is given on the success of an intermittent mist spray in preventing black spot. There is an interesting article on the possible cause of rose deterioration, which is attributed, by A. P. Wilson, to an unbalance in mineral nutrition. The local incidence of rose diseases in the British Isles is reported, and growing roses under tropical conditions is described. In addition to these articles there are many reports on the behaviour of rose varieties in 1960.

6789. Saakow, S. G.
Die Sortenbildung bei Rosen durch Knospenmutation. (**The production of rose varieties by bud mutation.**) [Russian and English summaries ¼ p. each.]
Arch. Gartenb., 1961, **8**: 595-629, bibl. 9.

Analyses of the occurrence of rose mutations show that these have been most frequent with the polyantha, pernetiana and hybrid tea groups. The number of mutations found per variety within the groups, the colours produced and the age at which varieties have mutated are also tabulated.—Bot. Inst., Acad. Sci., Leningrad.

6790. Anon.
Six weeks to garden sales for plants.
Flor. Exch., 1961, **136**(12): 21-2.

Before planting 3 rose varieties in containers for sale in the spring their roots and tops were pruned with various degrees of severity. The number of vigorous buds left did not seem to affect markedly the number of shoots produced, their length or flower production. The number of new shoots produced increased as the length of root left after pruning increased from 0 to 2 to 6 inches.

6791. Nevstrueva, R. I., and Novomlinčenko, A. F.
The floral biology of essential oil-yielding roses. [Russian.]
Agrobiologija, 1960, No. 6, pp. 943-4.

The 2 types of rose studied, *R. damascena* and *R. gallica*, both belong to the group of roses requiring a period of winter chilling for the production of flower primordia. The former species needed 85 days of low temperature treatment (0–15° C.) and when subsequently transferred to a glasshouse formed flower buds in 36 days. The latter species needed 56 days' chilling and produced flower buds after 45 days in the glasshouse.

6792. Fahmy, M., and El Bakly, S.
Estimation of yields of different varieties of roses, suitable for exportation, subjected to different treatments of fertilization.
Agric. Res. Rev., Cairo, 1959 (issued 1960), **37**: 415-38, bibl. 6, illus.

Various aspects of rose cultivation are briefly described. In an experiment 3 varieties, Signora, Chryslar Imperial and Rouge Meilland, were grafted on *Rosa chinensis* stock and given either 2 dressings each of 30 cu.m. F.Y.M. per acre or the F.Y.M. plus 3 applications each of 100 kg. of an N, P, K, Ca mixture. The order of yield in blooms per acre per annum was Signora, Chryslar Imperial and Rouge Meilland in both treatments, but the actual yields were more than doubled by the addition of the chemical fertilizers.

6793. Holmes, F. O.
Rose mosaic cured by heat treatments.
Plant Dis. Reptr, 1960, **44**: 46-7, bibl. 1, illus.

Another account of work abstracted in *H.A.*, 30: 5904.

6794. Gualaccini, F.
Ulteriori osservazioni sul ''mosaico giallo'' della rosa. (**Further notes on yellow mosaic of roses.**) [English summary 1 p.]
Bol. Staz. Pat. veg., Roma, 1960, **18**: 49-64, bibl. 25, illus.

Symptoms and transmission tests.

6795. Fisher, R. W., Chamberlain, G. C., and Kemp, W. G.
Control of powdery mildew of greenhouse roses with polybutenes.
Plant Dis. Reptr, 1960, **44**: 273-5, bibl. 1, illus.

Excellent control of powdery mildew (*Sphaerotheca pannosa*) on the highly susceptible variety of rose Pink Garnet Supreme was obtained with a series of four polybutene emulsion sprays at 7- to 10-day intervals. Karathane when followed by polybutene gave better control than a straight Karathane programme and no phytotoxicity resulted. In addition, the polybutene produced a sheen and enhanced the green colour of the leaves. [Authors' abstract.]—Vineland Stat., Canada Dep. Agric., Ontario.

6796. Ambrosi, M.
Prove orientative di lotta contro il mal bianco della rosa. (**Preliminary trials on the control of rose powdery mildew.**)
Not. Mal. Piante, 1960, No. 53/54, pp. 77-80.

In trials on the control of *Oidium leucoconium* var. *rosae* on the susceptible Dorothy Perkins and White Dorothy varieties fortnightly preventive sprays were applied from 12 April to 18 June of either 25% Karathane at 0·1% up to flowering and 0·05% during flowering or 80% colloidal sulphur at 0·15% up to flowering and 0·1% during flowering. Diseased plants were sprayed on 18 and 24 May and 4 and 18 June. A spreader was used with both fungicides. Karathane gave effective preventive and curative control. Colloidal sulphur gave some preventive control.—Osserv. Mal. Piante, Trieste.

6797. Atkinson, R. G.
Resistance of rose varieties to rust.
Canad. Plant Dis. Survey, 1960, **40**: 108.

The degree of infection on 18 H.T. varieties at Saanichton, B.C.

6798. Henneberry, T. J., Taylor, E. A., and Smith, F. F.
Foliage and soil treatments for the control of flower thrips in outdoor roses.
J. econ. Ent., 1961, **54**: 233-5, bibl. 3, illus.

Weekly spray applications of phorate reduced populations of flower thrips (*Frankliniella tritici*) on outdoor roses for up to 3 days after application. Similar spray applications of malathion were effective for 1 but not more than 2 days. Granulated phorate applied to the soil also reduced thrips populations in rose flowers. [Authors' abstract.]—U.S.D.A., Beltsville, Md.

6799. Ivanov, D., and others.
On the acids and esters in rose oil.
Perfum. essent. Oil Rec., 1960, **51**: 609-10, bibl. 3.

Confirmation of the presence of acetic and valeric acids, free and combined, and ethanol.

Other trees and shrubs.

(*See also* 5626, 5675, 5702, 5797, 6098, 6583, 6596, 6670, 6675, 6913, 6942, 7249, 7264.)

6800. Wright, J. A.
Container nursery stock studies.
Diss. Abstr., 1961, **21**: 2068-9, being *L.C. Card No. Mic.* 60-5934 of 109 pp.

Ilex cornuta and *Buxus harlandii* were grown in containers in one of 3 soil mixtures: A was soil, peat and sand; B was soil, composted cotton gin trash and sand; C was soil with Krilium. *Ilex* made its greatest total growth in medium B, whereas *Buxus* made the most growth in medium C. High application rates of ammonium sulphate caused injury and retarded growth, whereas Uramite at similar levels was much less phytotoxic. *Ilex* made 3 growth cycles in medium B, and only 1 or 2 cycles in A and C. Growth of both species started earlier in medium B than in A or C. There were statistically significant positive correlations of plant height in August and November with the soil content of nitrate N in August and with the soil content of P in November. There were statistically significant negative correlations of plant height in August with tissue contents of nitrate N in August, and with tissue contents of P in August and November. Statistically significant positive correlations were found between nitrate N and P in the tissue and these elements in the soil.—La St. Univ.

6801. Dickey, R. D.
Some factors affecting growth of three ornamental plant species in containers.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 358-61.

Two experiments are described. In the first the effects were tested of 4 factors at 2 levels each on the growth of container-grown *Viburnum suspensum*, *Ligustrum japonicum* and Formosa azalea. Three factors, i.e. the position of drainage holes in the cans, drainage material and watering frequencies of 2 and 4 days did not significantly affect growth. Plants in cans placed on soil grew better than those in cans placed on sawdust. In the second experiment the effects were evaluated of 8 potting media and 3 watering frequencies on the growth of *L. japonicum* and Formosa azalea. The potting components were peat, sand and perlite. Azaleas grew best in 100% peat, in 75% peat + 25% perlite and in 75% peat + 25% sand, and *L. japonicum* in 25% peat + 75% sand, in 100% perlite and in 75% peat + 25% sand. Both species grew better when watered every 3 or every 6 days than when watered every day.—Fla agric. Exp. Stat., Gainesville.

6802. Lange, O. L.
Die Hitzresistenz einheimischer Immer- und Wintergrüner Pflanzen im Jahreslauf. **(Heat resistance of indigenous evergreen plants during the year.)**
Planta, 1961, **56**: 666-83, bibl. 27, illus.

Leaves of *Erica tetralix* showed 5 phases of heat resistance during their 18-month growth cycle. After emergence in the spring, heat resistance increased to a peak in the summer, and then dropped in late summer or autumn. A second increase in heat resistance occurred during the winter, then a steep decrease in the following spring, followed by a third increase in the second and final summer. *Taxus* leaves showed a similar, but less pronounced, trend. Leaves of *Asarum europaeum* showed two periods of heat resistance in their 12-month cycle of growth, namely one in the hottest part of the summer and another in the coldest part of the winter; during the autumn leaves are heat sensitive. The heat resistance of leaves of *Ilex aquifolium* was complex. In all species, especially *Ilex*, young leaves were less heat resistant than older leaves.—Syst.-geobot. Inst., Univ. Göttingen.

6803. Cannon, T. F., Chadwick, L. C., and Reisch, K. W.
The nutrient element status of some ornamental trees.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 661-6, bibl. 10.

Leaf samples were taken from 10 or more unfertilized trees of *Crataegus phaenopyrum*, *Quercus palustris* and *Gleditsia* [*Gleditschia*] *triacanthos* *inermis* in July, August and September of two successive years and also in June of the second year. The N, P, K, Ca, Mg, Fe and Mn contents found in the leaves are tabulated. In all 3 species leaf N declined during the summer. In the hawthorn leaf Ca and Mg increased as the season progressed. In the oak leaf Mn decreased from July to August and increased again from August to September. The other elements remained relatively constant in all 3 species.—Ohio agric. Exp. Stat., Wooster.

6804. Davidson, H.
Nutrient-element composition of leaves from selected species of woody ornamental plants.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 667-72, bibl. 10.

Leaves of *Gleditsia* [*Gleditschia*] *triacanthos*, *Acer platanoides*, *Syringa vulgaris* and *Euonymus alatus* and shoot tips of *Juniperus chinensis pfitzeriana*, *Taxus cuspidata expansa* and *Euonymus fortunei* were collected from 5 Michigan nurseries during June, July and August, and analysed for 9 essential nutrient elements. All the elements except Fe exhibited a significant variation with species. The analysis indicated that N and K decreased in concentration with time; Ca, Mg, Fe and Mg increased; while P, B and Cu exhibited no statistical change in concentration with time. [Author's summary.]—Mich. St. Univ., E. Lansing.

6805. Hieke, K.
Vliv 2,3,5-trijodbenzoové kyseliny na růst a vývoj *Camellia japonica* L., *Cytisus canariensis* Comm. a *Clivia miniata* Rgl. **(The influence of 2,3,5-triiodobenzoic acid on the growth and development of *Camellia japonica*, *Cytisus canariensis* and *Clivia miniata*.)** [English, Russian and German summaries 1 p. each.]
Acta Průhoniciana, 1960, No. 1, pp. 12-29, bibl. 16, illus.

One-year-old plants of camellia with or without flower buds and 2-year-old plants of cytisus and clivia were sprayed 4 times or watered twice in the early spring with TIBA at 50 and 100 mg./l. In all the camellias spraying with the higher concentration retarded both growth and flowering; the lower concentration retarded shoot development in plants with flower buds, the opening of which was advanced. Both concentrations stimulated flower bud initiation on plants which had not flowered during the preceding year, but on plants which had flowered only the higher rate had any effect. In the cytisus both spraying and watering, especially at the lower rate, advanced flowering, prolonged the flowering period and increased the size of the plants. In the clivias the higher rate advanced flowering and stimulated growth.

6806. N.S.W. Dep. Agric., Entomology Branch.
Leaf cutting bees—Megachilidae.
Agric. Gaz. N.S.W., 1961, **72**: 91, 95, illus.

A 0·025% BHC or lindane spray applied to the foliage of roses, cherry, lilac, etc., should control leaf-cutting bees. Several sprays at 7–10-day intervals may be necessary.

6807. Rathgeber, C. H.
The structure and functioning of *Abutilon* nectaries.
From abstr. in *Aust. J. Sci.*, 1960, **22**: 478.

Electron microscopy has shown that there are numerous pores in the cuticle at the tips of the multicellular hairs on the nectary through which nectar is exuded. High concentrations of sugar in the nectar were found to be due to concentration in the nectary before exudation.—Univ. Sydney.

6808. Wyman, D.
Dozen varieties include best in shrub altheas.
Amer. Nurserym., 1961, **114**(1): 19, 121-7, illus.

Twelve varieties of *Hibiscus syriacus* are recommended and described, with groupings according to flower colour and time of flowering.

6809. Ahrendt, L. W. A.
***Berberis* and *Mahonia*: a taxonomic revision.**
J. Linn. Soc. (*Bot.*), 1961, **57**: 1-410, illus.

6810. Hieke, K.
Vliv stimulace a kvality řízků na zakořeňování kamélií (*Camellia japonica* L.). **(The effect of stimulation and quality of cuttings on the rooting of camellias.)** [English, Russian and German summaries ¾ p. each.]
Věd. Práce výzk. Úst. okrasn. Zahrad. ČSAZV, v Průhonicích, 1961, No. 1, pp. 157-84, bibl. 49, illus.

Rooting of camellias was inhibited by the presence of flower buds on the cuttings, the inhibition being greater in the summer than in the winter. In the winter cuttings showing renewed shoot growth were slower to root than cuttings not showing new growth. The application of a mixture of IAA and nicotinic acid (50 + 50 mg./l.) improved the rooting of cuttings that showed new growth in the winter but retarded it in cuttings with dormant buds. The treatment also only affected the length and number of roots in cuttings taken from young plants. Rooting ability declined with the age of the parent plant, and hence the use of cuttings from plants more than 10 years old is not recommended. In the summer cuttings without flower buds taken from older plants showed slightly improved rooting when the plants had been kept in the dark for 18 days.

6811. Narain, A.
Ornamental types in castor oil plant.
J. hort. Ass. Japan, 1960, **29**: 331-2, bibl. 2, illus.

The origin of 12 varieties with variegated, brightly coloured foliage and fruits is briefly stated. There is a coloured picture of the fruits.

6812. Everett, P. C.
Ceanothus griseus "Santa Ana".
Lasca Leaves, 1961, **11**: 2-4, illus.

A new evergreen variety is described, with hints on its propagation from tip cuttings.

6813. Adams, L., and Stefanescu, E.
Gibberellin and thiourea break seed dormancy in three species of California *Ceanothus*.
Abstr. in *Bull. ecol. Soc. Amer.*, 1961, **42**: 63.

Seed dormancy in *Ceanothus cordulatus*, *C. cuneatus* and *C. lemmonii* has been broken artificially by treating the seeds with boiling water, gibberellin and thiourea. The best treatment tried was boiling for 1 minute, gibberellin (400 p.p.m. in water) for 13 hours, and 3% thiourea for 1 hour. Germination percentages were *C. lemmonii* 98, *C. cuneatus* 84 and *C. cordulatus* 50. Lesser germination rates resulted from gibberellin at 2,200 and 800 p.p.m., and thiourea for 5 minutes, 24 and 72 hours.—Pacific S.W. Forest and Range exp. Stat., Berkeley, Calif.

6814. Tepfer, S. S.
The shoot apex and early leaf development in *Clematis*.
Amer. J. Bot., 1960, **47**: 655-64, bibl. 17, illus.

A morphological study.

6815. Westervelt, D. D., and Keen, R. A.
Cutting grafts of junipers II: Stionic effects.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 637-43, bibl. 3, illus.

Scions of the Canaert and Nevins Blue clones of the red-cedar (*Juniperus virginiana*) were side grafted on 3 different dates onto potted red-cedar seedlings and onto cuttings of the Andorra juniper (*J. horizontalis plumosa*) and the Hetz juniper (*J. chinensis*). The scion used had no effect on the success of the grafting operation, the rooting of the cutting-grafts or subsequent field survival. Likewise the rootstock used did not affect the take of grafts or rooting, but the plants on red-cedar seedling stocks showed better field survival and growth. There were no interactions between time of grafting, the rootstock used or the scion used. In general, the results suggest that cutting-grafts might be used to produce grafted junipers on a commercial scale, but some years must elapse before the compatibility and growth rates of the different stock-scion combinations can be finally determined. [For part I, see *H.A.*, 22: 2913.]—Kansas St. Univ., Manhattan.

6816. Chadwick, L. C.
Simazin—good fall weed killer.
Ohio Fm Home Res., 1959, **44**: 94.

Simazine applied in the autumn at 2–4 lb./acre gave excellent weed control in *Taxus cuspidata intermedia*, the effect lasting nearly 8 months.

6817. Hacskaylo, J.
Winter shearing salvages unmarketable trees.
Ohio Fm Home Res., 1959, **44**: 88-9, 95, illus.

Scots pines, grown as Christmas trees, were pruned in February when 7–8 ft. high by 3 different methods, viz. (1) pruning of current growth, (2) pruning of the 2-year-old wood, and (3) pruning of 3-year-old wood. In the second growing season after pruning trees which had had the current season's wood removed were of good shape and density and were marketable. Trees pruned by the second method required another growing season to become marketable, and trees pruned to the 3-year-old wood died during the second growing season.

6818. Howard, R. A.
Registration lists of cultivar names in *Cornus* L.
Arnoldia, 1961, **21**: 9-18.

6819. Natour, R. M.
A stem rotting disease of *Dracaena sanderiana* caused by an undescribed strain of *Aspergillus niger*.
Diss. Abstr., 1961, **21**: 2430, being *L.C. Card No. Mic.* 60-6678 of 74 pp.

Aspergillus niger var. *floridanus* is a soil-borne fungus with a high specificity for stems of *Dracaena*. Rootone, Fermate and Thylate applied as dusts to the base of tip cuttings gave complete protection against fungal invasion.—Univ. Fla.

6820. Martin, D.
Eucalyptus in Ireland.
Pap. Proc. roy. Soc. Tasmania, 1960, **94**: 51-6, bibl. 8.

Including brief mention of its use as an ornamental tree.

6821. Wyman, D.
Forsythias.
Amer. hort. Mag., 1961, **40**: 191-7, illus.
The forsythia story.
Registration lists of cultivar names of forsythias.
Arnoldia, 1961, **21**: 35-8, and 39-42.

The history of forsythias and an evaluation of species and varieties.

6822. Rose, S. A., and Dickey, R. D.
The effect of light, plunging medium and fertilization on bud set of *Gardenia jasminoides* "Veitchii".
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 362-3.

Rooted gardenia cuttings were planted in a 50:50 sand:peat mixture in 3-in. pots and were grown in a greenhouse under 3 light conditions (full sun, 50% shade and 50% shade between 6 August and 1 October), with 2 plunging media (peat and sawdust) and 2 fertilizer treatments. The fertilizer had no effect on bud formation. Plants given full sun and with the pots plunged in peat produced the most buds, followed by those given shade for part of the time and plunged in the same medium.—Fla agric. Exp. Stat., Gainesville.

6823. Edson, S. N., and Watkins, J. V.
Establishing a critical level for available iron for gardenias with the modified Comber soil test.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 344-6, bibl. 11.

Following earlier work on azaleas [see *H.A.*, 31: 1214] and using the same techniques, the critical level of iron for gardenias was found to be between 1 and 2 p.p.m. available Fe in the soil.—Univ. Fla, Gainesville.

6824. Wagenknecht, B. L.
Registration lists of cultivar names in *Gleditsia* L.
Arnoldia, 1961, **21**: 31-4.

Grouped by species.

6825. Asen, S., Stuart, N. W., and Specht, A. W.
Color of *Hydrangea macrophylla* sepals as influenced by the carry-over effects from summer applications of nitrogen, phosphorus, and potassium.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 631-6, bibl. 11.

Colour of Merveille and Todi hydrangea sepals was influenced to some extent by the concentrations of N, P and K available to the plants during the summer. Plants supplied with high concentrations of N and P during the summer had slightly redder sepals than similar plants supplied with low concentrations of these elements during this period. The slightly redder sepals due to high concentrations of available N and P during the summer were attributed to the decreased absorption and accumulation of Al. Similar and more pronounced effects on colour resulted from applications of N and P during forcing. Variations in the concentrations of available K during the summer had a much more pronounced effect on sepal colour than variations in the concentrations of available N or P. Plants supplied with a high concentration of available K during the summer were considerably bluer than similar plants supplied with a low concentration of this element during this period. The bluing effect of high concentrations of available K was attributed to the formation in the sepals of the K salt of delphinidin-3-glucoside. [Authors' summary. For earlier work, see *H.A.*, 29: 3928.] —U.S.D.A., Beltsville, Md.

6826. Schupper, J. F. B. M.
Onderzoek naar de opbrengsten van trekseringen in het bloemencentrum Aalsmeer. **(Studies on yields of forced lilac at Aalsmeer.)**
Overz. Landb.-Econ. Inst., 's Gravenhage **169**, 1960, pp. 17.

Figures collected from 12 holdings in Aalsmeer during the 1959-60 season reflect some of the cultural conditions for growing this crop. Madame Florent Stepman and Mlle Marie Legraye are the main varieties grown. Tables show the yields and returns per bush and per sq. m. of glasshouse and the monthly supply of forced lilac to the auctions.

6827. Zummo, N., and Plakidas, A. G.
Toxicity of PCNB to *Magnolia fuscata*.
Plant Dis. Reptr, 1960, **44**: 559.

Plants of *Magnolia fuscata* were defoliated by sprays of PCNB applied to the soil under camellias in their vicinity. Subsequent tests proved that the compound was absorbed more readily by the leaves than by the roots, but in both cases the final results were an unusual mottling and defoliation. The plants injured by foliar sprays recovered, but it is not yet certain whether soil application will cause chronic injury.—La St. Univ., Baton Rouge.

6828. Crane, H. S. J.
***Malus*, flowering and fruiting crab-apples.**
J. roy. hort. Soc., 1961, **86**: 160-7, illus.

Varieties described.

6829. Menninger, E. A.
Ornamental melaleucas for subtropical gardens.
Amer. hort. Mag., 1961, **40**: 221-5, illus.

Notes on several species.

6830. Mahlberg, P. G.
Embryogeny and histogenesis in *Nerium oleander*. II. Origin and development of the non-articulated laticifer.
Amer. J. Bot., 1961, **48**: 90-9, bibl. 20, illus.

Part I, on the organization of primary meristematic tissues, was published in *Phytomorphology*, 1960, **10**: 118-31.

6831. Wagenknecht, B. L.
Registration lists of cultivar names in the genus *Pieris* D. Don.
Arnoldia, 1961, **21**: 47-50.

6832. Miller, R. O., and Kiplinger, D. C.
Day length and temperature control needed for poinsettias.
Ohio Fm Home Res., 1959, **44**: 92-3, illus.

Plants maintained under normal day length conditions from 22 September until 10 October flowered 20 or more days earlier than plants which were exposed to extra light at night for periods ranging from 5 min. to 3½ hours. The time taken to flower was reduced by keeping the temperature at 70° F., compared with 62° F., providing the day length was shortened to 8 hours from October onwards. Thorough watering was essential to prevent premature leaf drop.

6833. Lindstrom, R. S.
The response of floricultural crops to various growth regulators. I. Effect of (2-chloroethyl) trimethylammonium chloride on poinsettia (*Euphorbia pulcherrima*, Willd.).
Quart. Bull. Mich. agric. Exp. Stat., 1961, **43**: 839-47, bibl. 2, illus.

Poinsettia plants were given a soil drench of 10^{-2} M. or 5×10^{-2} M. of (2-chloroethyl)trimethylammonium chloride (CCC). Plants propagated on 25 May were significantly dwarfed by 3 applications of 100 ml. of CCC at 5×10^{-2} M. made at monthly intervals; bract development on treated plants was similar to that of the controls. With plants propagated on 2 August the most effective dwarfing combined with good bract development was observed on plants treated with 10^{-2} M. CCC on 4 October. [See also *H.A.*, 31: 1044.]

6834. McFadden, L. A., and Creager, D. B.
Recent occurrence of bacterial blight of poinsettia in Florida.
Plant Dis. Reptr, 1960, **44**: 568-71, bibl. 7, illus.

See *H.A.*, 31: 1211.

6835. Bateman, D. F.
Environment and the poinsettia root rots.
Bull. N.Y. St. Flower Grs, 1961, No. 186, pp. 1-4.

Low soil pH (below 5·3) reduced root rot caused by *Thielaviopsis basicola* and *Pythium ultimum*. Low soil temperature (below 71° C.) had a controlling influence on root rot caused by *Rhizoctonia solani*. *Pythium* root rot was reduced in the presence of low soil moisture regardless of the levels of other environmental factors involved. A combination of low soil pH (4·0–5·3), low soil moisture (below 45% moisture-holding capacity) and low soil temperature (about 65° F.) resulted in the least disease infection, regardless of the pathogen or combination of pathogens present. [For earlier work, see *H.A.*, 29: 767.]

6836. Gilmer, R. M.
A blight of ground cherry and Russian almond seedlings caused by *Gloeosporium fructigenum* Berk.
Plant Dis. Reptr, 1960, **44**: 395.

A severe tip blight of young ground cherry [*Prunus fruticosa*] and Russian almond [*P. tenella*] seedlings was identified as being caused by *Gloeosporium fructigenum*. The fungus was seed-borne, and was sufficiently deep-seated in some seeds to withstand mild surface sterilization. [Author's summary.] —N.Y. St. agric. Exp. Stat., Geneva.

6837. Harris, J. H., Haasis, F. A., and Smith, C. F.
Azaleas and camellias.
Ext. Circ. N.C. agric. Ext. Serv. **246**, revised 1960, pp. 29, illus.

Varieties, resistance and susceptibility to cold, soil requirements, planting, nutrition, pruning, propagation and control of pests and diseases.

6838. Harris, J. H., Haasis, F. A., and Smith, C. F.
How to grow azaleas and camellias.
Ext. Folder N.C. agric. Ext. Serv. **185**, 1960, 1 folded sheet, illus.

General culture, disease and pest control.

6839. Poole, R. T., and Dickey, R. D.
Effect of levels and time of application of nitrogen and potassium on the growth of container grown *Viburnum suspensum* and *Rhododendron indicum* "Formosa".
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 394-7, bibl. 9.

The growth response was tested of rooted rhododendron and viburnum cuttings growing in a soil-perlite-peat mixture to 3 levels each of N and K applied at 3 intervals. For both species N was the major limiting factor, each increment of N resulting in a large increase in vegetative growth. The rhododendron responded also to more frequent applications, plants fertilized every 2 weeks producing more growth than those fertilized every 8 weeks. Viburnum showed a significant response to K only at the highest N level.—Fla agric. Exp. Stat., Gainesville.

6840. Oertli, J. J.
Die Wirkung von Ammonium und Nitrationen auf das Wachstum und die Mineralstoffzusammensetzung von Azaleen. **(The effect of ammonium and nitrate ions on the growth and mineral composition of azaleas.)** [English and French summaries ⅓ page each.]
Gartenbauwiss., 1960, **25**: 293-302, bibl. 18.

Azalea plants were grown in water culture solutions with NH_4, NO_3 or a mixture of the two as sources of N, and with different levels of Fe. Each source of N proved capable of producing vigorous, healthy plants, but to prevent chlorosis the plants in NO_3 solutions required a higher Fe concentration. The beneficial effect of NH_4 ions on the Fe nutrition of azaleas can probably be explained by the differential effect of NH_4 and NO_3 ions on the pH of the external solution. More N, but less Ca + Mg and K, were taken up from solutions containing only NH_4 nitrogen.

6841. Martin, L. W., Wiggans, S. C., and Payne, R. N.
The use of gibberellic acid to break flower bud dormancy in azaleas.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 590-3, bibl. 9.

Dorothy Gish azalea plants, almost ready for a cold temperature conditioning treatment, were sprayed with GA and kept in the greenhouse under warm temperature forcing conditions. Spray concentrations of 100, 500 and 1,000 p.p.m. GA were applied to the leaves and buds 1, 3, 7 and 14 times at intervals of 3 and 6 days over a 6-week period. Control plants included (a) those given a standard cool temperature treatment and (b) those left untreated in the greenhouse. In winter months the GA treatments hastened flowering by from 12 to 34 days in comparison with the cold temperature control treatment. Earliness was associated with the higher treatment level (higher concentrations of GA and more applications), while a single application of GA had little or no effect on earliness of flowering. The treated plants were as saleable as those receiving the normal 6-week cold temperature treatment. Azalea plants sprayed in the spring of the year (mid-March) were not as uniform in flowering or as saleable as those given a cold treatment. [Authors' summary.]—Okla. St. Univ., Stillwater.

6842. Ballantyne, D. J.
Growth regulators and the flowering of evergreen azaleas (*Rhododendron* cv.).
Diss. Abstr., 1961, **21**: 2843-4, being *L.C. Card No. Mic.* 61-877 of 79 pp.

Foliar sprays of TIBA inhibited the formation of multiple flower buds, whereas one of 2,200 p.p.m. IAA promoted their formation. The rate of flower bud development was increased by storage for 2 weeks at 37° F. followed by 2 sprays of 200 p.p.m. TIBA or single sprays of 160, 400 or 1,000 p.p.m. TIBA, and was also increased by 3 weeks' storage at 45° F. followed by a single spray of 1,000 p.p.m. IAA. Gibberellic acid at 1,000 p.p.m. also increased the rate of flower bud development. Dormancy of flower buds was broken by foliar sprays of 900 p.p.m. potassium gibberellate applied before or after 2 weeks' storage at 37° F. or without cold storage. Four weeks at 37° F. broke dormancy without the gibberellate spray. The rate of flower bud development was reduced by NAA at 9 p.p.m. or above. Apical dominance was removed by TIBA at 800 p.p.m. or more. Tests indicated that a growth inhibitor in flower buds was removed by 3 or more weeks at 37° F. and by 3 applications of 1,000 p.p.m. potassium gibberellate.—Univ. Md.

6843. Allison, P.
Azalea petal blight is in the Philadelphia area.
Morris Arbor. Bull., 1960, **11**: 27-30, illus.

Ovulinia azaleae may be controlled by spray applications of zineb or Actidione-RZ to the plants during flowering or of Actidione-RZ to the ground during dormancy. The disease and the symptoms it causes are described and illustrated

6844. Santamour, F. S., Jr.
Performance of five selected black locust clones at the Morris Arboretum.
Morris Arbor. Bull., 1960, **11**: 67-70, bibl. 14, illus.

6845. Menninger, E. A.
***Tabebuia*—our best yard trees.**
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 366-73, illus.

Including descriptions of several species.

6846. Thomas, J. L.
The cytology of some cultivated species of *Viburnum*.
J. Arnold Arbor., 1961, **42**: 157-64, bibl. 7, illus.

Chromosome numbers and aberrations.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

Avocadoes.

(*See also* 5796.)

6847. Furon, V.
L'avocatier en Côte d'Ivoire. Premières observations sur la collection et les carrés pilotes de la station d'Azaguié. (**Avocado pears in the Ivory Coast. Preliminary observations on the collection and pilot plots at the Azaguié station.**)
Fruits d'Outre Mer, 1961, **16**: 24-7.

Of the 22 avocado varieties introduced, those which produced fruit of satisfactory quality were Peterson, Pollock, Lula, Booth 8 and Hall. In many cases the trees flowered sporadically. Fungus diseases were a greater problem than pests.—Inst. franç. Rech. fruit. O.M.

6848. Comelli, A.
Avocats d'Israël. (**Avocadoes in Israel.**)
Fruits d'Outre Mer, 1961, **16**: 57-60, illus.

Notes on 9 varieties, with photographs of the fruits. [See also *H.A.*, 31: 1218.]

6849. Rodrigues, J., and Ryan, G. F.
The influence of season and temperature on carbohydrates in avocado shoots.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 253-61, bibl. 22.

Changes in sugar and starch contents of Hass shoots were noted in relation to season and are here discussed. Low temperature effects were considerable.—Univ. Calif., Los Angeles.

6850. Schroeder, C. A.
Some morphological aspects of growth in subtropical fruits.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 248-52, bibl. 15.

Responses of avocado fruits to wounding, and observations on the growth of detached avocado and citron fruit tissues *in vitro*.

Citrus—general.

(*See also* 5781, 7246.)

6851. HODGSON, R. W.
Notes and observations on citriculture in India.
Citrus Ind., 1961, **42**(3): 35-7, 40-2, bibl. 7.

Historical background, economic geography, climatic conditions and reactions, distinctive practices and production problems.

6852. FAZIO, G.
Possibilità e risorse di una nuova agrumicoltura. (**Possibilities and resources for renewing citriculture.**)
Progr. agric., Bologna, 1961, **7**: 605-19, illus.

Production and trade statistics for Sicily and recommendations for reorganizing citrus growing, with State aid, in southern Italy and the Italian islands.

6853. FRIEND, W. H., AND HANCOCK, B. G.
Citrus orchard management in Texas.
[*Publ.*] *Tex. agric. mech. Coll.* **B-963**, 1960, pp. 16, illus.

Establishment, subsequent care and marketing.

6854. (GOODALL, G. E.)
Another year of achievements for Citrus Field Research, Inc.
Calif. Citrogr., 1961, **46**: 207-8.

The results of trials of lemon strains are tabulated. A good strain of sweet orange is recommended as the best all-round lemon rootstock. Sampson tangelo, grapefruit and sour orange have proved satisfactory as rootstocks under certain conditions but are not generally recommended. Vapam in basin treatment prior to replanting individual trees in sweet orange-rooted orchards is recommended for the prevention of gummosis. DBCP (5 gal./acre) applied for the control of citrus nematodes on lemon tree roots resulted in a 20% increase in yield. Non-tillage weed control with neburon is recommended.

Citrus—breeding, varieties and rootstocks.

(*See also* 5796, 6899, 6902, 6921.)

6855. ZORIN, F. M.
New developments in citrus breeding. [Russian.]
Priroda, 1961, **50**(5): 43-9, illus.

A popular account of the principles of citrus breeding, some results obtained at Soči and descriptions of trees, including the so called friendship-tree which comprises many species and varieties grafted together.

6856. ČERNENKO, E. S.
Plant surgery. [Russian.]
Priroda, 1961, **50**(4): 101-3, bibl. 1, illus.

Methods of grafting citrus to obtain vegetative hybrids and for studying rootstock-scion relationships are described. Grafts comprising several components were produced, including a so-called tree-orchard the crown of which comprises 18, and the root system 10, species and varieties.

6857. MAMPORIJA, F. D.
Metabolism and the formation of vegetative hybrids with different heredity. [Russian.]
Agrobiologija, 1961, No. 1, pp. 50-61, bibl. 3.

A discussion of possible mechanisms of vegetative hybridization in citrus.

6858. RÍOS C., D.
Clave para la identificación de ocho variedades de limón. (**A key for identifying eight lemon varieties.**) [English summary ¼ p.]
Rev. Fac. nac. Agron., Medellín, 1960, **20**(55): 59-94, bibl. 21, illus.

Bonnie Brae, Genoa, Mexicano, Meyer, Nativo, Perrine, Rugoso and Variegado.

6859. GARDNER, F. E., AND REECE, P. C.
Evaluation of 28 navel orange varieties in Florida.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 23-8.

Vigour, cropping and fruit composition were studied in 28 varieties and strains of the same age, all on sour orange rootstock and growing under the same conditions. The most consistent cropper was Thomson C-10235, the small tree size of which, however, limits yield per acre. Attention is directed to Washington C-51618, a very vigorous variety which crops well; Washington C-43571, C-45577 and C-45552 also appear to yield better than any of the commonly planted Florida "old-line" varieties.—U.S.D.A., Orlando, Fla.

6860. HAWTHORNE, P. L., AND OTHERS.
Plaquemines: a new seedless orange.
Circ. La agric. Exp. Stat. **67**, 1960, 1 folded sheet, illus.

A bud sport from the variety Pineapple.

6861. SCHROEDER, C. A.
Observations on the Satsuma orange in Japan.
Calif. Citrogr., 1961, **46**: 197-200.

Bud mutations have provided a number of distinct varieties and strains of the Satsuma orange, which is perhaps the most frost resistant of all citrus and will mature in areas which are too cool for other oranges. Cultivation, labour costs and the varietal situation are discussed.—Univ. Calif., Los Angeles.

6862. KEFFORD, J. F., AND CHANDLER, B. V.
The influence of rootstocks on the composition of oranges, with special reference to bitter principles.
Aust. J. agric. Res., 1961, **12**: 56-68, bibl. 13.

Trifoliate orange rootstocks tended to give high yields of juice, which was high in acidity and soluble solids content but low in ascorbic acid content and in bitter taste when canned. Rough lemon stocks tended to give low yields of juice, which was low in acidity and soluble solids content but high in ascorbic acid content and in bitter taste. A positive correlation was demonstrated between the bitter taste of canned juices and the concentrations of limonoid bitter principles in the peel of Washington Navel oranges and in the peel and seeds of Valencia Late oranges. Trifoliate orange stocks promoted the disappearance of bitter principles from all parts of the fruit with advancing maturity, but rough lemon stocks retarded this process. Tangelo and Cleopatra mandarin stocks resembled trifoliate orange in their effects on orange composition, whereas sweet lime, Kusaie lime, and East Indian lime stocks resembled rough lemon. [From authors' abstract.]—C.S.I.R.O., Homebush, N.S.W.

6863. El Mahmoudi, L., Salama, S. B., and Ibrahim, R.
Effect of rootstocks and frequency of irrigation on the marketability of oranges.
Agric. Res. Rev., Cairo, 1959, **37**: 443-65, bibl. 8.

Experiments were conducted with 15-year-old Egyptian orange trees grafted on sour orange and Egyptian lime rootstocks, plots of each receiving either 9 irrigations of 300 cu.m./acre or 13 of 200 cu.m./acre per annum. No differences in the juice content or colour of the fruits (after acetylene gas treatment) were noted, but the frequent light irrigation accelerated the development of colour in fruit on the sour orange stock and of the flavour in fruit on both stocks. Flavour developed earlier in fruit on the lime stock. The highest soluble solids content was in fruit on sour orange stock provided with frequent light irrigations, and the lowest acidity on lime stock provided with the same irrigations. Light, frequent irrigations also increased the rate of both vitamin C formation and general fruit maturation.

Citrus—soil management and nutrition.

(*See also* 5852, 6863, 6903.)

6864. Martin, J. P., Harding, R. B., and Garber, M. J.
Relation of soil properties and plant composition to growth of citrus seedlings in 100 non-fumigated and fumigated old citrus soils.
Soil Sci., 1961, **91**: 317-23, bibl. 24.

Sweet orange seedlings were grown in the greenhouse in 98 old citrus and 4 non-citrus fumigated and non-fumigated soils, and relative growth was correlated with soil chemical, physical and biological properties and with plant composition. Relative growth varied from 16 to 87% in the non-fumigated soil and from 26 to 116% in the fumigated soil. Fumigation of the soil with propylene oxide increased seedling dry weights by 20 to 211% in 87 of the soils, and increased the leaf Ca, Mg and B and slightly reduced the P contents of the plants grown in the majority of the soils. Fumigation also corrected Mn deficiency of plants grown in soils of low Mn availability. Very poor growth in the fumigated soils was associated with exchangeable Na percentages >5, low soluble-P values, sticky clay loam soils or with very sandy type soils. In the non-fumigated soils relative growth was negatively correlated with pH of soil paste, exchangeable K, soluble HCO_3, leaf Na, root Na, root Mg and acid-soluble P, and positively with leaf Mn, soluble nitrate N in the original soils and root Ca. In the fumigated soil exchangeable Na by itself was observed to have a relatively high negative correlation with growth, but in its relationship to the other important variables its contribution was outstanding. In addition, per cent silt and acid-soluble P were positively correlated, and exchange capacity and root Mg negatively correlated, with yield. The study supports the observation that citrus plants will make relatively good growth over a wider range of certain soil properties in the absence of plant root parasites than in their presence. [From authors' summary.]—Univ. Calif., Riverside.

6865. Kretchman, D. W.
Chemical weed control in Florida citriculture.
Citrus Mag., 1961, **24**(7): 22-3, 25, 33, bibl. 4, illus.
Dalapon for controlling perennial grasses in Florida citrus groves.
Down to Earth, 1961, **16**(4): 6-9, bibl. 3, illus.

In pasture land being planted to citrus 2 applications, with an interval of 5–14 days, of Dowpon at 5–7·5 lb./acre are recommended for the control of bermuda grass, guinea grass, para grass, pangola grass, bahia grass, maiden cane and napier grass. Foliar sprays of 2,4-D and/or 2,4,5-T at 4 lb./acre total a.i. will control brush or perennial vines. Urox at the rate of 150-200 lb./acre and Karmex at 40–50 lb./acre will control weeds in ditches. Weeds on ditch banks or in the water may be controlled with 2,4-D, 2,4,5-T, Kuron or Dowpon, taking care to avoid citrus leaves and roots. Simazine at 8–10 lb./acre gave seasonal control of annual weeds under young citrus without tree injury when applied a few days after cultivation. [See also *H.A.*, 31: 1261.]—Fla Citrus Exp. Stat., Lake Alfred.

6866. Harrison, D. S.
Water control in low-land citrus.
Citrus Ind., 1961, **42**(3): 28-9.

Tile drainage and the economics of water control discussed.

6867. Mathias, A. F.
Changes in fertilizer program and yields in citrus since 1931.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 9-12.

Fertilizer and yield records were compiled for 23 years on a Valencia orange grove and for 29 years on a group of mixed citrus. The fertilizer ratios changed from low N, high K to about equal rates of each, resulting in yield increases of from 131 to 487 boxes per acre. The cost of fertilizer per box decreased from an average of 16 cents to 14½ cents, whereas the cost per acre increased from \$23·19 to \$73·12. [From author's summary.]—Haines City Citrus Grs' Ass.

6868. Impey, R. L., and Jones, W. W.
Rate of absorption of urea by intact leaves of Washington Navel orange.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 181-5, bibl. 7.

Absorption of urea was at least 92% complete after 30 hours in both young and mature leaves of 4-year-old budded orange trees, growing in soil in 4-gal. containers in a lath house at Riverside, following the application of 1·54 mg. of N in doses of 0·05 ml. of 5% urea plus a spreader.

6869. Impey, R. L., and Jones, W. W.
Effects of biuret on nitrogen status of Washington Navel and Valencia orange leaves.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 186-92, bibl. 7.

Results of trials at Riverside with urea sprays show that free biuret was present in the apical positions of all leaves injured by biuret. Injured leaf tips contained less total N, protein N and chlorophyll and lipid N but more water-soluble N than healthy ones. Protein values for the injured tips were not so low as had been expected, and it is, therefore, suggested that, if biuret inhibits the formation of leaf proteins, the inhibition is confined to certain proteins. Several amino acids were found to have accumulated in the injured tissue.

6870. Dikshit, N. N.
Complete recovery of young citrus plants from chlorosis by application of nitrogen and sprays of zinc.
Sci. and Cult., 1961, **27**: 90-1, bibl. 3.

Chlorosis in 4-year-old mandarins was corrected to some extent by N fertilization (1 lb. ammonium sulphate or calcium ammonium nitrate per tree), but recovery was more rapid and complete in plants which were also sprayed at monthly intervals with zinc diethyldithiocarbamate at 34 g./4 gal. water. —Citrus Die-back Stat., Coorg.

6871. Smith, P. F., and Rasmussen, G. K.
Relationship of fruit size, yield and quality of Marsh grapefruit to potash fertilization.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 42-9, bibl. 11, illus.

In a grove of 12-year-old trees 3 levels of K fertilizer were tested for 7 years. The low level consisted of no fertilizer for 3 years, then sulphate of potash-magnesia at 30 lb. of K_2O per acre applied each February, and from the 5th year a supplementary 60 lb. of K_2O in October. The medium and high rates were 60 and 150 lb. of K_2O, respectively, in the same form applied in February and again in October each year. With the low rates yields were unaffected for the first 3 years, then declined for 2 years, but were fully restored after the supplementary autumn application; fruit size declined slightly each year. The medium and high rates did not differ appreciably with regard to yield and fruit size. Foliar analyses showed that yield depression occurred when the K content of 4-5-month-old leaves fell below 0·7%. The higher K rates increased acidity in every year and vitamin C content in most years, but on the whole did not affect total soluble solids.—U.S.D.A., Orlando, Fla.

6872. Hunziker, R. R.
The relationship of soil potassium and leaf potassium status to yield of citrus in the Indian River area.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 36-9, bibl. 5.

Maximum yield in the experiments here reported was associated with leaf K_2O levels of at least 1 to 1·2% in oranges and 1·3 to 1·5% in grapefruit. In low-yielding, N-deficient areas leaf K_2O may exceed these values despite low levels of soil K. No optimum value for extractable soil K, applicable to all soil types, was established. A somewhat better correlation was observed between yield and percent K saturation of the soil than for yield and extractable soil K. [From author's conclusions.] Indian River Field Lab., Fort Pierce.

6873. Martin, J. P., Ervin, J. O., and Shepherd, R. A.
Influence of exchangeable Na and K at different base-saturation levels on growth and composition of citrus plants.
Soil Sci., 1961, **91**: 273-9, bibl. 23, illus.

A study was made of the influence of the degree of base saturation of Yolo and Hanford sandy loams on the tolerance of sweet orange seedlings to relatively high exchangeable K and Na percentages. Increasing exchangeable Na and K decreased plant growth. The magnitude of growth reduction was greater in base-saturated soils or soils containing excess lime, or both, than in 70% base-saturated soils. With the exception of K and Ca concentrations in the plants [leaves and roots] grown in Yolo sandy loam, the greater growth retardation in the high-lime series caused by comparable Na or K percentages was not associated with marked differences in Na or K absorption or with greater reduction of Ca or Mg absorption. Excess lime reduced leaf Mn, Zn, Cu, Fe and B. [Authors' summary. For similar work on trifoliate orange, see *H.A.*, 30: 4309.]—Univ. Calif., Riverside.

6874. Spencer, W. F., and Wander, I. W.
A comparison of magnesium sources for young orange trees.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 28-35, bibl. 14.
See *H.A.*, 31: 3132.

6875. Monselise, S. P.
On the presumed salt-tolerance of Siamese pummelos.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 19-23, bibl. 14.

Siamese pummelo seedlings were grown in undrained plastic buckets, containing about 10 kg. of heavy brown clay, to which sodium chloride was later added. At $EC_e = 13{\cdot}5$ mmhos/cm. seedlings made very poor growth and died within a few months. Dry weight of branches, leaves and roots, trunk diameter, total chlorophyll and ascorbic acid contents of leaves, as well as the ratio of chlorophyll *a* to *b*, were found to be negatively correlated, while the sodium content of leaves, and especially of roots, was positively correlated, with EC_e in the range 2·5 and 6 mmhos/cm. Under the conditions of this experiment Siamese pummelos have not shown the high salt tolerance which is generally attributed to them in Thailand. [From author's summary.]—Hebrew Univ., Rehovot.

Citrus—growth and reproduction.

(*See also* 5766.)

6876. Turrell, F. M.
Growth of the photosynthetic area of citrus.
Bot. Gaz., 1961, **122**: 284-98, bibl. 46.

The growth of the photosynthetic area of Valencia orange trees was determined from the total number and blade lengths of leaves from 4 trees of 3, 6, 12 and 29 years of age. The frequency curves were normal in the 3 youngest trees. Physical characteristics, such as tree height, crown volume and trunk diameter, were also determined. Correlations are presented which provide means of converting data in terms of one measured characteristic into those of another. The number of leaves increased more rapidly with age than did any other above-ground characteristic of the trees. Mean leaf-blade area per tree and mean leaf-blade fresh weight per tree decreased with the age of the tree. In a single season's study of the leaf growth of 4 varieties of citrus (Valencia and Washington Navel oranges, Eureka lemon and Marsh grapefruit) it was found that the power function effectively described leaf-blade area in terms of blade length. The allometric coefficient was distinctive for leaves of each variety of citrus and was largest for Valencia orange; it varied with the age of the tree from which the leaves were picked. The data presented make it possible to estimate the degree of leaf damage or to make studies requiring measurements of leaf area without removing leaves from the tree.—Univ. Calif., Riverside.

6877. Krezdorn, A. H.
The influence of girdling on the fruiting of Orlando tangelos and navel oranges.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 49-52, bibl. 9.

Girdling at full or late bloom greatly increased the fruit set and yields of both tangelos and oranges without affecting vigour. The treatment is recommended for tangelos as an interim measure until suitable pollinators are found, or to be used in conjunction with a pollinator such as Dancy in years when the bloom of the latter is very light or does not coincide with that of Orlando. For young, unfruitful navels of bearing age girdling is suggested only on a trial basis. All fruit produced through girdling was seedless or nearly so. Univ. Fla., Gainesville.

6878. Mustard, M. J.
Progress report on the unfruitfulness of the Minneola tangelo.
Ceiba, 1961, **9**: 45-8, bibl. 3.

The tangelo variety Minneola was shown to be self-sterile, but with pollen from the varieties Seminole and Lake the fruit-set percentages were 18·9 and 9·3, respectively. The fruits developed from Lake pollination were seedless and were shed more readily than those from Seminole pollination, where the sound seeds averaged 39·8 per fruit. Comparatively low seed numbers resulted from open pollination. In one experiment in which 6 rows of Minneola were planted between Seminole and Lake, the Minneola yield per row fell from an average of 13 bushels in the outermost rows (adjacent to the pollinators) to about 7·5 bushels in the second row and 6 bushels in the third row from the pollinators. Top working of Minneola with pollinators is being attempted.—Univ. Miami, Fla.

6879. Cameron, J. W., Cole, D., Jr., and Nauer, E. M.
Fruit size in relation to seed number in the Valencia orange and some other citrus varieties.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 170-80, bibl. 21.

Trials carried out for 4 seasons at Riverside, Calif., on the Valencia orange indicated that, by and large and with certain not entirely well defined exceptions, large fruits were associated with numerous seeds. In Minneola tangelo large open-pollinated fruits contained significantly more seeds than small open-pollinated fruits, and cross-pollinated fruits were larger and had more seeds than small open-pollinated fruits. Valencia cross-pollinated by Pearl tangelo set significantly more fruits and with more seeds than after self-pollination, but there was no significant difference in fruit size.

6880. Cohen, I., and Ben-David, A.
Effect of spraying Clementine citrus trees with "Color-set" (2,4,5-TP) on the fruit. [Hebrew, with English summary and conclusions 2 pp.]
[*Publ.*] *Citrus Mktg Bd Israel*, 1961, pp. 21, bibl. 7.

A full bloom spray of 2,4,5-TP (10·6% active ingredient) at 3 ml./10 l. decreased the average number of seeds per fruit. Spraying when the fruits were 5 mm. in diameter reduced drop, increased fruit diameter and total yield. A full crop was produced on sprayed trees situated far from the Dancy mandarin pollinator trees.

6881. Coggins, C. W., Jr., Hield, H. Z., and Garber, M. J.
The influence of potassium gibberellate on Valencia orange trees and fruit.
Coggins, C. W., Jr., Hield, H. Z., and Boswell, S. B.
The influence of potassium gibberellate on Lisbon lemon trees and fruit.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 193-8, bibl. 8, illus., and 199-207, bibl. 4, illus.

In trials both with oranges and lemons in Orange County, Calif., technical KGA was used at concentrations of 0, 37·5, 75, 150 and 800 p.p.m. acid equivalent. In both cases increased leaf drop and modification of vegetative growth resulted. With oranges fruit size decreased with all concentrations, but with lemons it was generally unaffected. There were varied effects on fruit rind composition and colours in both fruits, and these are discussed. In neither fruit was there any appreciable increase in yield.—Univ. Calif., Riverside.

Citrus—physiology and fluorine responses.

(*See also* 5613, 5756, 6927.)

6882. Bean, R. C., Porter, G. G., and Steinberg, B. M.
Carbohydrate metabolism of citrus fruits. II. Oxidation of sugars by an aerodehydrogenase from young orange fruits.
J. biol. Chem., 1961, **236**: 1235-40, bibl. 25, illus.

Nine sugars were oxidized to the corresponding aldonic acids, and it appears that a single enzyme, prepared from the juice sacs, may be responsible. It exists in the fruit only for a short time after the cell division stage of growth and was found in 8 of 13 citrus species tested, as well as in *Poncirus trifoliata*. [For part I, see *H.A.*, 31:1291.]—Univ. Calif., Riverside.

6883. van Noort, D., and Wallace, A.
Involvement of adenylate kinase in phosphorylation of ribose-5-phosphate by adenosinediphosphate in mitochondria-free preparations from rough lemon leaves.
Plant Physiol., 1961, **36**: 368-70, bibl. 8.

Both CO_2-fixation studies and measurement of the adenylate phosphate end products indicated that an adenylate kinase was the mechanism whereby adenosinetriphosphate was formed from adenosinediphosphate.—Univ. Calif., Los Angeles.

6884. Brewer, R. F., and others.
Some effects of hydrogen fluoride gas on bearing Navel orange trees.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 208-14, bibl. 6, illus.

Data from experiments at Riverside, Calif., on young Washington Navels budded on Troyer citrange rootstocks show the navel to be susceptible to low concentrations (2–3 p.p.b.) of HF in the air. Growth and vigour were reduced by subjection to such concentrations, though easily distinguishable visible symptoms were absent. The minimum fluorine concentration in the leaves that was associated with visible chlorosis and necrosis symptoms was 75 p.p.m. F on a dry weight basis. The most pronounced effect of HF on growth was a 25 to 35% reduction in average leaf size.

6885. Brewer, R. F., Sutherland, F. H., and Guillemet, F. B.
Sorption of fluorine by citrus foliage from equivalent solutions of HF, NaF, NH_4F and H_2SiF_6.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 215-19, bibl. 5.

In trials at Riverside more F was absorbed by citrus leaves sprayed with NaF and HF than by those sprayed with NH_4F and H_2SiF_6. Differences in ion size rather than degree of ionization are thought likely to be the reason for this.

Citrus—diseases.

(*See also* 6933, 6934, 7261.)

6886. Carpenter, J. B., and Furr, J. R.
Wood pitting of undetermined cause in unbudded citrus seedlings.
Plant Dis. Reptr, 1960, **44**: 916-18, bibl. 6, illus.

The pitting described has not caused any apparent reduction in growth or vigour, but it could cause confusion because of its similarity to pitting associated with virus infections.

6887. Rossetti, V., and Salibe, A. A.
Levantamento das doenças de vírus dos cítros no Estado de São Paulo. **(A survey of citrus virus diseases in São Paulo State.)**
Biológico, 1961, **27**: 29-32, bibl. 9.

Prior to the registration of virus-free material.

6888. WEATHERS, L. G., AND CALAVAN, E. C.
Additional indicator plants for exocortis and evidence for strain differences in the virus.
Phytopathology, 1961, **51**: 262-4, bibl. 7, illus.

Sweet lime, sweet lemon and Cuban shaddock (a lemon hybrid) as indicators.

6889. CHILDS, J. F. L., AND CARPENTER, J. B.
Observations on stubborn and other diseases of citrus in Morocco in 1959.
Plant Dis. Reptr, 1960, **44**: 920-7, bibl. 20, illus.

Stubborn disease appears to be the most serious disorder of citrus in Morocco. The occasional appearance of symptoms on previously healthy trees 15 years of age and older suggests that such trees become infected after planting. Symptoms often appear to be accentuated by factors which depress tree vigour, such as damage to roots or incorrect fertilization.—U.S.D.A.

6890. GRANT, T. J., MOREIRA, S., AND SALIBE, A. A.
Report on general aspect of tristeza, and stem pitting in citrus varieties in Sao Paulo, Brazil.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 12-16, bibl. 15.

Observations have shown that yellowing, stem pitting, leaf cupping, die-back, stunting and wilting are merely different symptoms of tristeza. A plan has been drawn up for studying the problem in Brazil, where stem pitting is a specific problem and the vector *Toxoptera citricidus* exists.—U.S.D.A., Orlando, Fla, and Inst. Agron., Campinas, Brazil.

6891. MCCLEAN, A. P. D.
Transmission of tristeza virus to *Aeglopsis chevalieri* and *Afraegle paniculata*. [Afrikaans and French summaries 1 p. each.]
S. Afr. J. agric. Sci., 1961, **4**: 83-94, bibl. 8, illus.

Tristeza virus is readily transmitted to *Aeglopsis chevalieri* and *Afraegle paniculata* by means of the aphid vector, *Toxoptera citricidus*, but the virus is not transmissible across the graft union formed between these two species and species of citrus. [Author's abstract.] There was evidence of poor graft compatibility when 3 types of citrus were grafted on *Aeglopsis* and *Afraegle*, which may account for the failure of the virus to cross the union.—Div. Plant Path., Pretoria.

6892. FRASER, L. R.
Woody gall, a suspected virus disease of rough lemon and other citrus varieties.
Proc Linn. Soc. N.S.W., 1959, **84**: 332-4, bibl. 1, illus.

The symptoms of the disease, which is transmissible by budding, are described.

6893. FISHER, F. E.
Greasy spot and tar spot of citrus in Florida.
Phytopathology, 1961, **51**: 297-303, bibl. 30, illus.

Tar spot, affecting both leaves and fruits, is considered to be distinct from greasy spot which affects leaves; potentially tar spot is the more serious disease. Evidence is presented showing that the diseases are due to 2 species of *Cercospora*. Names proposed for the 2 species are *C. citri-grisea*, causing greasy spot, and *C. gigantea*, causing tar spot. Oil emulsion, copper or zineb applied from mid-June to early August gave satisfactory control of greasy spot. An oil-zineb mixture also controlled scale insects and fruit russet and the Zn in the zineb reduced or prevented Zn deficiency.—Fla Citrus Exp. Stat., Lake Alfred.

6894. KNORR, L. C., AND MALAGUTI, G.
Halo scab—result of an association of *Elsinoë fawcetti* and *Brevipalpus phoenicis* destructive to sour-orange seedlings.
Plant Dis. Reptr, 1960, **44**: 662-3, bibl. 5, illus.

Scab (*Elsinoë fawcetti*) lesions by themselves cause neither defoliation nor death of sour oranges, but when the lesions were found surrounded by yellow haloes, 2 to 5 mm. wide, leaf shedding occurred leading to the death of the affected plants. Microscopic examinations showed the chlorotic borders to be heavily infested by *Brevipalpus phoenicis* mites. [For mite control, see *H.A.*, 31: 3166.]—Fla Citrus Exp. Stat., Lake Alfred.

6895. CETAS, R. C., AND WHIDDEN, R.
Evaluation of soil fungicides against *Fusarium solani* isolated from feeder roots of citrus trees.
Plant Dis. Reptr, 1960, **44**: 465-9, bibl. 9, illus.

In laboratory experiments the 3 most effective fungicides tested against *F. solani*, a secondary causal agent of spreading decline, were DAC-649 (3,3,4,4,-tetrachlorotetrahydrothiopene-1,1-dioxide), nabam and Vapam, applied as soil drenches. Neither captan nor PCNB gave satisfactory results. —U.S.D.A., Orlando, Fla.

6896. KLOTZ, L. J., AND OTHERS.
Heat treatments to destroy fungi in infected seeds and seedlings of citrus.
Plant Dis. Reptr, 1960, **44**: 858-61, bibl. 11.

It is now recommended that seeds be immersed in water at 125° F. for 10 minutes to ensure destruction of *Phytophthora citrophthora* and *P. parasitica*. [See also *H.A.*, 27: 2791 and 29: 812.]—Univ. Calif., Riverside.

6897. STOLZY, L. H., AND OTHERS.
Effects of *Phytophthora* spp. on water used by citrus seedlings.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 240-4, bibl. 4.

Experiments with sweet orange seedlings growing in concrete cylinders at Riverside showed that growth was more affected by lack of moisture than by the presence of *Phytophthora parasitica* and *P. citrophthora*, but also that the destruction of roots by the *Phytophthora* spp. significantly reduced the rate of water uptake by the trees in the second season.

6898. PRASAD, N., AND BHATNAGAR, G. C.
Sphaeropsis knots on lime (*Citrus medica* var. *acida* Linn.) in Rajasthan.
Curr. Sci., 1961, **30**: 110-11, bibl. 1, illus.

'Witches' broom symptoms caused by *S. tumefaciens*.

Citrus—pests.

(*See also* 5738, 6894, 7261, 7266, 7270.)

6899. FORD, H. W., FEDER, W. A., AND HUTCHINS, P. C.
Citrus varieties, hybrids, species and relatives evaluated for resistance to the burrowing nematode, *Radopholus similis*.
Plant Dis. Reptr, 1960, **44**: 405.
CHAPOT, H.
Découverte de porte-greffes d'agrumes résistant aux nématodes. **(The discovery of nematode-resistant citrus rootstocks.)**
Fruits d'Outre Mer, 1961, **16**: 10-11, illus.

See *H.A.*, 31: 3158; promising types found in Florida include rough lemons A and B, Clone X, sweet oranges Sanguine Grosse Ronde and Pineapple-156 and Carrizo citrange.

6900. FORD, H. W., AND FEDER, W. A.
***Citropsis gilletiana*, a citrus relative resistant to the burrowing nematode in laboratory tests.**
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 60-4, bibl. 10, illus.

The roots of vigorous cuttings of *C. gilletiana*, a rare plant native to the Congo, have shown outstanding resistance.

6901. TARJAN, A. C.
Longevity of *Radopholus similis* (Cobb) in host-free soil. [French summary ¼ p.]
Nematologica, 1961, **6**: 170-5, bibl. 8.

Burrowing nematodes did not survive for more than 6 months in sandy soil in Florida when no suitable host roots were present.

6902. BAINES, R. C., BITTERS, W. P., AND CLARKE, O. F.
Susceptibility of some species and varieties of citrus and some other rutaceous plants to the citrus nematode.
Plant Dis. Reptr, 1960, **44**: 281-5, bibl. 8.

Moderate or severe infestation by *Tylenchulus semipenetrans* was recorded in 23 named citrus species. Among 12 varieties or selections of *Poncirus trifoliata* the tetraploid form of Frost was infested severely, the diploid form slightly, and the remaining varieties were highly resistant. Infestation of citrange varieties was slight in the varieties Texas and Uvalde, moderate in Carizzo, Cunningham, Morton and Troyer, and severe in Coleman, Rusk and Savage. The degree of susceptibility is tabulated for 12 non-citrus species of the Rutaceae and for 20 citrus interspecific and intergeneric hybrids. The value of *P. trifoliata* for use as a rootstock and for breeding nematode-resistant citrus hybrid rootstocks is indicated.—Univ. Calif., Riverside.

6903. RINKOV, A., AND OTHERS.
The use of the onion test as a quantitative method for determining the distribution of emulsifiable DBCP in soil.
VAN GUNDY, S. D., AND OTHERS.
Studies on methods of application of emulsifiable DBCP around living citrus trees.
Plant Dis. Reptr, 1960, **44**: 510-15, bibl. 8, illus., and 830-3, bibl. 3.

The distribution of emulsifiable DBCP in the soil, as measured by the percentage reduction in the growth of onion seedlings, and the control of the citrus nematode (*Tylenchulus semipenetrans*) were closely related. Using this onion test the second article compares 3 methods of applying DBCP to control the nematode, namely by sprinkler, furrow and basin irrigation. Basin irrigation gave the most uniform distribution of the fumigant and the best nematode control. Furrow irrigation did not give satisfactory distribution, and with sprinkler irrigation no fumigant was detected in the soil under the trees. By applying greater than normal quantities of irrigation water with the DBCP deeper distribution of the fumigant was obtained.—Univ. Calif., Riverside.

6904. CHITWOOD, B. G., AND TOUNG, M.-C.
Host-parasite interactions of the Asiatic pyroid citrus nema.
Plant Dis. Reptr, 1960, **44**: 848-54, bibl. 1, illus.

The host range and gross pathology of the Asiatic citrus root-knot nematodes in Taiwan are given. Suggested interim control measures include the use of *Crotalaria* spp. as cover crops, *Tripsacum guatemalensis* as a green manure, and strawberries, groundnuts, oats (var. Minhafer), soya beans (var. Whip-Poor-Will) and peppers as trap crops and ground covers.—Kaiser Found. Res. Inst., Richmond, Calif., and Citrus Exp. Stat., Yangmingshan, Taiwan.

6905. (FEDER, W. A.)
Sugar kills nematodes.
Agric. Res., Wash., 1961, **9**(9): 3-4, illus.

In laboratory tests all nematodes were killed within an hour by solutions containing 30–40% sucrose or 10% glucose, which have O.P.'s of 22 atmos. and 12 atmos., respectively. Tests in plots of okra growing in soil with a moisture content of 1–2%

showed that 1% dextrose effectively reduced root-knot nematodes. Sour orange and Duncan grapefruit plants, grown in infested soil, had clean roots if sugar had been added before planting, but plant growth was inhibited unless the sugar was flushed out with water 24 hours after treatment.—U.S.D.A., Orlando, Fla.

6906. WHITEHEAD, V. B.
Insect pests of citrus trees in home gardens. 1. Red scale. 2. Soft brown scale. 3. Aphids, psylla and caterpillars.
WHITEHEAD, V. B., AND MYBURGH, A. C.
Idem. 4. A summary of recommendations.
Dec. Fruit Gr, 1961, **11**: 5, 35-6, 73-4, all illus., and 103.

Descriptions and control measures for red, mussel and soft scales, mealy bug, Australian bug, aphids, psylla, citrus caterpillar, fruit fly and red spider.

6907. ANON.
Combate de los acaros en cítricas. (**Control of citrus mites.**)
Not. agríc. Serv. Shell Agric., Venezuela, 1961, **2**: 105-6, illus.

In Venezuela good control of *Phyllocoptruta oleivora*, *Brevipalpus* spp. and *Eutetranychus banksi* may be obtained with a single application in the second half of April or in May of 250 c.c. of Akar 338 plus 3 l. white oil in 200 l. water or 500 g. zineb plus 3 l. white oil in 200 l. water or 500 g. wettable sulphur in 200 l. water. For the protection of the second crop a second application should be made in the latter half of August.

6908. CINCADZE, K. V.
Selective properties of preparations with systemic action. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(8): 40.

One of the most injurious pests of citrus groves in Adžar A.S.S.R. is *Metatetranychus citri*, against which chemical control measures are not only ineffective but also result in heavy mortality of the parasites *Stethorus punctillum* and *Oligota flavicornis*. In tests with systemic insecticides in Georgia 5% demeton emulsion, introduced into the bark 20–25 cm. above the ground caused heavy mortality of the mites by the fifth day. By the 15th day complete mortality was observed, and for 3–4 months the trees were pest-free. Spraying with 0·025% demeton in a superphosphate solution resulted in complete mortality of the adults in 3 days and a complete kill of the eggs after 15 days, but, because of re-infestation, the treatment had to be repeated.

6909. ROSSETTI, V., AND SALIBE, A. A.
Experiências sôbre o contrôle da leprose em citrus. (**Experiments on the control of citrus rust mite.**) [English summary 1 p.]
Arq. Inst. biol. S. Paulo, 1959, **26**: 119-30, bibl. 17, illus.

In an experiment on potted 1-year-old Pêra orange plants in the open Dithane Z-78 at 150 g. per 100 l. and Kelthane W at 200 g. per 100 l. gave equally good control of *Phyllocoptruta oleivora*, viz. a reduction of the number of lesions to 22–24% of those found on control plants. In 2 further experiments on young sweet orange pot plants, which were regularly moved to eliminate the effect of the mites' preference for strong sunlight, the mean percentages of the total number of lesions in the 3 treatments were 66% in the control, 30% with Dithane and 4% with Kelthane.

6910. JOHNSON, R. B.
The effect of copper on rust mite control with four rust mite miticides.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 84-9, bibl. 6, and *Citrus Ind.*, 1961, **42**(3): 5-7, 16, 18, bibl. 6.

For the effect of copper on zineb, see *H.A.*, 31: 1322. Copper did not modify the control obtained with Kepone, chlorobenzilate or sulphur, the most effective of which was Kepone. [See also *H.A.*, 31: 5189.]

6911. AVIDOV, Z., AND GOTHILF, S.
Observations on the honeydew moth (*Cryptoblabes gnidiella* Milliere) in Israel. I. Biology, phenology and economic importance.
Ktavim, 1960, **10**: 109-24, bibl. 13, illus.

On citrus the damage caused by the honeydew moth was not generally sufficient to warrant control measures, but the carob moth (*Myelois ceratoniae*) caused significant economic damage in all groves examined. No control measures are given.

6912. BARTLETT, B. R., AND LAGACE, C. F.
Interference with the biological control of cottony-cushion scale by insecticides and attempts to re-establish a favorable natural balance.
J. econ. Ent., 1960, **53**: 1055-8, bibl. 12.

Biological control of *Icerya purchasi* by the vedalia beetle, *Rodolia cardinalis*, in the desert citrus areas of California was so severely upset by insecticidal drift arising from the treatment of other adjoining crops that chemical control became necessary. Vedalia destruction was most often caused by parathion, DDT and especially malathion applied from the air during the early spring. By restricting drift through the co-operation of neighbouring growers the problem of *Icerya* on desert citrus was largely solved. Attempts to rear vedalia and to introduce other natural enemies of *Icerya* did not give satisfactory results.—Univ. Calif., Riverside.

6913. HELY, P. C., AND GELLATLEY, J. G.
The purple or mussel scale, *Lepidosaphes beckii* (Newm.).
Agric. Gaz. N.S.W., 1961, **72**: 14-18, 39, illus.

Life history, damage caused and control measures on citrus and holly.

6914. Simanton, W. A.
The reduced status of purple scale as a citrus pest.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 64-9, bibl. 6, and *Citrus Ind.*, 1961, **42**(4): 5-9, bibl. 6.

Purple scale, *Lepidosaphes beckii*, has usually required 1 or 2 sprays annually for control, but *Aphytis lepidosaphes* [see also *H.A.*, 30: 2765] decimated the scale population in 1959 and shows promise of maintaining commercial control. Amongst 97 commonly used pesticides sprayed in 22 groves only sulphur inhibited effective control by *Aphytis*. Weather fluctuations appeared to have little effect on the ability of this parasite to check purple scale. [From author's summary.]—Fla Citrus Exp. Stat., Lake Alfred.

6915. Pen, Č.-Ju.
Citrus white fly—new pest in the Adžar A.S.S.R. [Russian.]
Zašč. Rast. Vred. Bolez., 1960, **5**(7): 46-7, illus.

Dialeurodes citri has become one of the most injurious pests of citrus in the Adžar republic. There are 3 generations a year and the larvae damage the trees by feeding on the leaves and thus providing entry to pathogenic fungi. Chemical control measures have proved ineffective, but a search for a parasite of the pest showed that the entomogenous fungus *Aschersonia* sp. infects *D. citri* in China. Infection of the pest by the imported fungus was successful in the laboratory and measures for mass infection are planned. The pest was also parasitized by the fly *Eretmocerus longipes*.

6916. le Roux, F. H., and Basson, W. J.
The "burn" of citrus trees by parathion sprays. The cause: salinity.
Fmg S. Afr., 1961, **37**(2): 54-6, illus.

The defoliation and fruit drop which occurred in Lowveld areas after spraying with parathion was found to be related to salinity in the top 24 in. of soil.

Citrus—fruit quality and composition.

(*See also* 6862.)

6917. Long, W. G., and others.
Variations in quality of Florida grown Duncan grapefruit.
Citrus Ind., 1961, **42**(3): 30-4, bibl. 12.

The results of measuring and analysing 8 samples of 6 sizes of fruit (1,200 individual fruits) for acidity, solids and ascorbic acid are discussed, and recommendations are made for the improvement of quality of fresh fruit shipments.

6918. Habeeb, H., and Ismail, Z.
Ascorbic acid, relationship between its amount in citrus fruit peel, juice and leaves and other qualities of fruit.
Agric. Res. Rev., Cairo, 1959, **37**: 514-24, bibl. 9.

The ascorbic acid content of both the peel and the juice usually varied inversely with the weight of the fruit; that of the peel was directly related to the total soluble solids in the juice and the fruit stem leaves. In the peel the ascorbic acid content of the flavedo was much higher than that of the albedo, but there was a positive correlation between the two.

6919. Long, W. G., and Childs, J. F. L.
Differences in Temple orange color and quality associated with "stylar-end greening".
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 92-5, bibl. 13.

Temple oranges with stylar-end greening had a similar chlorophyll absorption peak to that shown by immature green fruit, but the peak transmittance wavelength was nearer that of ripe fruit than green fruit. The soluble solids contents of both calyx and stylar halves in affected fruits were considerably lower than in normal fruits, but the ratio between them was not reversed, whereas the ratio between the total acid contents in these halves was the opposite of that found in control fruit.—U.S.D.A., Orlando, Fla.

6920. Monselise, S. P., and Halevy, A. H.
Detection of lycopene in pink orange fruit.
Science, 1961, **133**: 1478, bibl. 8.

Lycopene is shown to be the pink colouring pigment in Sarah, a pink sport of the Shamouti (Jaffa) orange, together with other unidentified carotenoids This is a condition similar to that found in pink and red grapefruit, whereas the red pigments of blood oranges are anthocyanins. [Authors' abstract.]—Hebrew Univ., Rehovoth.

6921. Huet, R.
L'amertume du jus d'orange navel. **(Bitterness in navel orange juice.)** [English, German, Spanish and Russian summaries approx. 10 lines each.]
Fruits d'Outre Mer, 1961, **16**: 61-5, bibl. 19.

The formation of the bitter substance limonin in the juice of Washington Navel and Valencia oranges after extraction is enhanced by pasteurization. Methods of avoiding or correcting the bitterness are reviewed. It is suggested that trifoliate orange rootstocks might with advantage replace sour orange in Morocco to ensure the production of navel oranges lacking the precursor of limonin.—Inst. franç. Rech. fruit. Outre Mer.

6922. SALTER, C. A.
Composition of natural lime oil.
Chem. Ind., Lond., 1961, No. 24, pp. 835-5, bibl. 5,

Chromatographic comparisons are reported between écuelled Dominican and distilled lime oil, and certain fractions were also compared with cold-pressed Sicilian lemon oil.—Schweppes (Home) Ltd., The Hyde, Hendon.

6923. THEILE, F. C., DEAN, D. E., AND SUFFIS, R.
A modern approach to the evaluation of bergamot oil.
Perfum. essent. Oil Rec., 1960, **51**: 535-40, bibl. 4.

Ultra-violet and infra-red spectrometry and vapour-phase chromatography were used to identify the constituents; certain physical and chemical characteristics are given.

Citrus—fruit harvesting and handling.

(*See also* 5928, 5937.)

6924. COPPOCK, G. E., AND JUTRAS, P. J.
An investigation of the mobile picker's platform approach to partial mechanization of citrus fruit picking.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 258-63, bibl. 6, illus.

The requirements of an efficient picker's platform are outlined, and an experimental design is described which made a 40% increase in picking rate possible. [See also *H.A.*, 31: 5207.]—Fla Citrus Exp. Stat., Lake Alfred.

6925. PHILLIPS, R. V., AND GRIERSON, W.
Cost advantages of bulk handling. II. The Chapman automatic loader.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 231-5, bibl. 7, illus.

This machine, basically a bulk grove truck holding the equivalent of approximately 90 boxes of oranges, has a hydraulically powered hoist and a system of chutes and baffles to reduce fruit damage. Costings, which are given, show a reduction of 5 to 6 cents per box in handling and transport costs. [For part I, see *H.A.*, 28: 2993.]—Fla Citrus Exp. Stat., Lake Alfred.

6926. GRIERSON, W.
Establishment of orderly citrus marketing in Latin America.
Ceiba, 1961, **9**: 3-12, bibl. 11, illus.

Recommendations on fruit grading for size, avoidance and control of fruit rots, waxing, degreening and artificial colouring, trade associations and maturity standards.

6927. EAKS, I. L., AND LUDI, W. A.
Effects of temperature, washing and waxing on the composition of the internal atmosphere of orange fruits.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 220-8, bibl. 20, illus.

Results of studies at Riverside, Calif., are summarized as follows: 1. The higher the holding temperature, the higher the carbon dioxide content and the lower the oxygen content of the internal atmosphere. 2. Washing and waxing tended to increase the carbon dioxide content and decrease the oxygen content of the internal atmosphere of the fruit, the degree of the change depending upon the wax used. 3. Washing increased weight loss of fruit and waxing reduced weight loss compared with that of unwashed fruit. 4. Under the conditions of these tests washing and waxing had little influence on the respiratory rate of the fruit at 20° C. The apparatus used in this work is described and illustrated.

6928. OBERBACHER, M. F., AND GRIERSON, W.
Handling methods for fresh Florida lemons: low temperature curing studies with the Sicilian variety.
GRIERSON, W., AND TING, S. V.
Florida lemons for fresh and cannery use: variety selection and degreening methods.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 236-40, bibl. 16, and 284-9, bibl 18.

Both papers describe experiments on preparing Florida lemons for the fresh fruit market. This can be done irrespective of their colour provided they are picked at the correct size, are not washed and precautions are taken against mechanical damage, shrivelling and decay. Rapid colouring in unwashed lemons was obtained with ethylene treatment at 85° F., but this greatly increased decay, whereas with diphenyl pads in closed containers good colour was obtained in 2–3 weeks at 60° F. The second paper also reports that for canned juice all varieties except Bernia had adequate acid contents; Villafranca was outstanding.—Fla Citrus Exp. Stat., Lake Alfred.

6929. GRIERSON, W., OBERBACHER, M. F., AND THOMPSON, W. L.
Fruit color, grove practices and fresh fruit packout with particular reference to tangerines.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 96-100, bibl. 13.

Sale values showed that packing house degreening cannot adequately compensate for colour deficiencies in the fruit at harvest.—Fla Citrus Exp. Stat., Lake Alfred.

6930. HOPKINS, E. F., AND MCCORNACK, A. A.
Effect of delayed handling and other factors on rind breakdown and decay in oranges.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 263-9, bibl. 2, illus., and *Citrus Ind.*, 1961, **42**(3): 9-10, 12, 14, bibl. 2, illus.

Oranges, which were degreened at a R.H. of 85% and over, or at a lower R.H. immediately after picking, were washed, waxed, packed and stored at 70° F., together with oranges that were processed and packed without degreening, some of which had been left unwashed standing in open field crates for 2 days before processing. A high incidence of rind breakdown was observed in fruit degreened at 74% R.H., whereas degreening at 94% R.H. produced no breakdown. The fruit treated at the lower R.H. also decayed much more rapidly. A high percentage of breakdown also occurred in fruit which had been left for 2 days before processing, and in oranges which had been left outdoors. No significant difference in total decay was observed between pulled and clipped fruits with regard to rind breakdown or decay. Rind breakdown may be prevented in ungassed fruit by keeping them in degreening rooms, without ethylene, at 85° F. and a high R.H.

6931. GRIERSON, W., AND HAYWARD, F. W.
Precooling, packaging, and fungicides as factors affecting appearance and keeping quality of oranges in simulated transit experiments.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 229-39, bibl. 26, illus.

The results of trials of various treatments and combinations of treatments at Lake Alfred, Florida, are presented in detail. The single most effective decay control measure was the use of diphenyl pads in the master cartons. The best over-all decay control was obtained when oranges, packaged in perforated polythene bags packed in master cartons, were first treated with Dowicide A (0·1% sodium o-phenylphenate) plus hexamine and provided with diphenyl pads for shipment at 60° F. The practical difficulty of adopting this treatment is that most Florida citrus fruits are packed at temperatures of 80° F. or above, when without efficient cooling they may develop off-flavours. In general, the results lead to the strong recommendation that fungicides should be used as well as pre-cooling, and that both the master cartons and polythene bags containing pre-cooled oranges should be clearly marked "keep refrigerated".

6932. SMOOT, J. J., MECKSTROTH, G. A., AND MELVIN, C. F.
Promising decay inhibitors for postharvest use on Florida oranges.
Plant Dis. Reptr, 1960, **44**: 383-6, bibl. 6.

In direct comparison three compounds (carbanilic acid, *m*-chloro-, isopropyl ester; hydracrylonitrile carbanilate; and 2-propyn-1-ol carbanilate) were more effective in all tests than sodium orthophenylphenate plus hexamine. Water-wax emulsions of the last 2 of these compounds gave promising results. [From authors' summary.]—U.S.D.A., Orlando, Fla.

6933. ROISTACHER, C. N., KLOTZ, L. J., AND GARBER, M. J.
Tests with volatile fungicides in packages of citrus fruits during shipment to eastern markets.
Phytopathology, 1960, **50**: 855-60, bibl. 10.

Where results were statistically separable, commercially handled citrus fruit treated with biphenyl had less decay, soilage and chemical injury than those treated with ammonia. Both treatments were significantly superior to no treatment in control of decay. In these tests biphenyl caused no apparent injury of the fruit; ammonia, however, under conditions that produced excessive condensation of moisture, occasionally injured the rind of lemons and navel oranges. This injury was not seen on Valencia oranges. With artificially inoculated fruit treatments varied in their relative efficacy in controlling decay. For lemons biphenyl was superior to ammonia. For navel oranges the results with ammonia and biphenyl could not be separated statistically. For Valencia oranges ammonia was distinctly better than biphenyl. For all varieties both treatments were significantly superior to no treatment. [Authors' summary.]—Univ. Calif., Riverside.

6934. MOREAU, C.
Pollution fongique de l'atmosphère. Pourriture brune des agrumes en entrepôts. Moyens de les combattre. (**Fungicidal pollution of the atmosphere. Citrus brown rot in stores. Methods of control.**)
Fruits et Prim., 1961, **31**: 75-80, illus.

Recent investigations have shown that the chief causes of brown rot are *Phytophthora parasitica* (sometimes masked by secondary *Penicillium* infections) in oranges and *Phomopsis citri* in lemons. The main sources of infection are diseased fruit rejected during grading and left in the packing sheds, packing-case wood and dust. The atmosphere of the sheds should be disinfected each evening by spraying Albothene P80, an organic derivative of boron, at 0·3–0·4 c.c. per cu. m. of space, and the walls and ceilings should be painted with fungicide. [See also *H.A.*, 31: 5212.]

6935. DUPAIGNE, P., ROBIN, A., AND BOGDANSKA, H.
Dosage du bore dans les agrumes. (**Boron determination in citrus.**)
Fruits d'Outre Mer, 1961, **16**: 71-3, bibl. 6,

A colorimetric method using Chromotrope 2B was adopted to determine B residues on the outer and inner peel and in the juice of oranges previously treated with [sodium?] pentaborate, with or without subsequent washing and/or brushing. The results showed that the residues, particularly on the surface, were greatly reduced by the combined cleaning treatment. Tests carried out on samples of different origin showed higher residues in Spanish than in Israeli or North African fruit.

6936. ANON.
Sea transport of citrus.
Commonw. Prod., 1961, No. 382, p. 49, from *Trop. Abstr.*, 1961, **16**, Abstr. i1500.

In South Africa portable refrigeration units of 10–11 tons capacity have recently been constructed and tested during 9 voyages in comparison with (1) full refrigeration in insulated space at 4–5° C., and (2) full ventilation in insulated space. The portable refrigerator kept the cargo at temperatures rising from 2° C. initially to a maximum of between 10–16° C. all through the tropics. The condition of the fruit on discharge was closely similar to that of the fully refrigerated cargo at 4–5° C.

6937. McKinley, W. P., and Yasin, R.
Paper chromatographic identification of thiourea in extracts of oranges.
J. Ass. off. agric. Chem., 1960, **43**: 829-30, bibl. 5, illus.

In the presence of pesticides and other interferences.

Dates.

6938. Almandil, A. R.
Chemical control of spoilage of dates.
Diss. Abstr., 1961, **21**: 1697, being *L.C. Card No. Mic.* 60-4579 of 74 pp.

Dates in the *rutab* stage were found to be more susceptible to spoilage organisms than at the *khalal* and *tamar* stages, and the *kimri* stage was most resistant. Captan at 500 p.p.m. completely inhibited fungus growth at room temperature for about 15 days, and after 1 month 75% of the fruit was still free from spoilage. Mycostatin gave good results but was less effective than captan. The spoilage organisms were retarded during storage at 40–45° F.; after such storage for 25 days there was no spoilage of fruits in the *rutab* stage, and captan and Mycostatin gave protection for 90 days. Rainfall during fruit ripening is one of the most important environmental factors in date fruit spoilage. There was less spoilage in the centre of small, well-aerated bunches than in larger bunches. When fruits were treated at various stages of development captan and Mycostatin still gave the best results in reducing symptoms of spoilage.—Utah St. Univ.

6939. Salama, S. B., Ibrahim, R., and Mostafa, S.
Studies on the storage of Zaglool dates.
Agric. Res. Rev., Cairo, 1959, **37**: 466-80, bibl. 8.

The effects on quality were investigated of 3 storage temperatures and of 4 storage treatments, viz. washing and packing in boxes lined either with waxed paper or polythene, and washing, coating with paraffin oil and packing in both types of box. Coating with paraffin oil had little effect on percentage decay, but storage in polythene-lined boxes preserved quality much longer and at all temperatures than storage in waxed paper-lined boxes. The least decay was observed in coated fruit kept in polythene-lined boxes. The safe storage period was only 5 days at 65° F., but it was a month or more at 45° or 32° F. The tannin content was lower in coated fruit at all 3 temperatures.

6940. El Shiati, M. A., Atwa, A. A., and Esawy, M. T.
Studies on the storage of Samany dates.
Agric. Res. Rev., Cairo, 1959, **37**: 491-513, bibl. 15.

The dates were either dipped in a 0·2% solution of calcium hypochlorite for 3 minutes at 110° F. or left undipped, and were packed with or without a coating of liquid paraffin in boxes lined with either tissue paper or polythene. Storage was at 65° or 32° F. The least decay occurred at 32° in polythene; at 65° disinfection and polythene packing gave the best results. The useful storage life was 10 days at 65° F. and 44 days at 32° F. The longest market life after cold storage was obtained with the dates coated with paraffin and packed in tissue-lined boxes.

Feijoas.

(*See also* 5869.)

6941. Kvarachelija, M. S.
Concerning the problem of self-sterility and self-fertility of some varieties and seedlings of *Feijoa sellowiana*. [Russian.]
Agrobiologija, 1960, No. 5, pp. 782-5, illus.

Of 17 varieties tested only 3 were found to be fully self-fertile, and 6 others partially self-fertile. Four of the main varieties are described and illustrated.

6942. Taylor, J. B., and Joiner, J. N.
Rooting response of *Feijoa sellowiana* and *Myrica rubra* as affected by 2,3,5-triiodobenzoic acid and 3-indolebutyric acid.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 363-6, bibl. 14.

Cuttings of *F. sellowiana* and *M. rubra* were soaked in TIBA or IBA, at 0·3 to 11·0 p.p.m., for 24 hours and placed in a sterilized 50:50 mixture of peat and perlite under intermittent mist from 8 a.m. to 5.30 p.m. With feijoa 1·1 p.p.m. TIBA gave the best rooting, viz. 42% compared with 15% in the controls. The rooting of *M. rubra* was poor and was not affected by the growth substances. [For earlier work, see *H.A.*, 31:1344.]—Univ. Fla, Gainesville.

Loquats.

(*See also* 7261.)

6943. Popenoe, J.
Evaluation of loquats at the Sub-tropical Experiment Station.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 315-16, bibl. 1.

Oliver is the most popular variety; it has orange coloured flesh and ripens in mid-season.

Macadamias.

(*See also* 5796.)

6944. Zentmyer, G. A.
Phytophthora canker of macadamia trees in California.
Plant Dis. Reptr, 1960, **44**: 819, bibl. 2.

The trunk and branches are susceptible to *P. cinnamomi* only when the fungus is introduced through a wound. Roots appear to be resistant.—Univ. Calif., Riverside.

Olives.

(*See also* 6135, 7252.)

6945. Bonnet, P.
L'olivier en France. Normes internationales de qualité des huiles d'olive. (**Olive growing in France. International standards of quality for olive oils.**)
Oléagineux, 1961, **16**: 359-61, illus.

The recent history and current problems of French olive growing and oil marketing are discussed. It is pointed out that origin, as well as quality, should be notified in commercial transactions, in order to safeguard special high-quality oils such as those produced in Provence.

6946. T—, R.
Considerazioni sull'olivicoltura in Tunisia. (**Observations on olive growing in Tunisia.**)
Olearia, 1960, **14**: 238-46.

Production from 1925 onward, and responses of yields and leaf composition to N fertilizing.

6947. Foytik, J.
California olive industry: trends and outlook.
Circ. Calif. agric. Exp. Stat. **492**, 1960, pp. 33.

Production, products and economics.

6948. Larcher, W.
Jahresgang des Assimilations- und Respirationsvermögens von *Olea europaea* L. ssp. *sativa* Hoff. et Link., *Quercus ilex* L. und *Quercus pubescens* Willd. aus dem nördlichen Gardaseegebiet. (**The annual course of assimilation and respiration in *Olea europea* ssp. *sativa*, *Quercus ilex*, and *Q. pubescens* in the northern district of Lake Garda.**)
Planta, 1961, **56**: 575-606, bibl. 80.

The assimilation rate of mature olive shoots was highest in the summer. At 22° C. and about 50,000 Lux cut branches fixed about 7·8 mg. CO_2/hr./sq. dm. of double-sided leaf surface. The ability to assimilate CO_2 continued unchanged into November. With the first frosts assimilation by shoots of the current season was reduced to about two-thirds of the summer level. Maximal and optimal temperatures for assimilation were reduced, and respiration increased to 1·3 to 1·5 times that of the shoots in summer. Following a series of frosty days (temperatures between —2° C. and 5° C.) assimilation dropped to its minimum (37% of peak assimilation in summer), but was not completely stopped even after 14 days of frost. After over-wintering the shoots are physiologically older and assimilation throughout the year was 5% lower than that in the autumn of the first year of growth.—Bot. Inst., Univ. Innsbruck.

6949. Larcher, W.
Zur Assimilationsökologie der immergrünen *Olea europaea* und *Quercus ilex* und der sommergrünen *Quercus pubescens* im nördlichen Gardaseegebiet. (**Ecological aspects of assimilation of the evergreen *Olea europea* and *Quercus ilex* and the deciduous *Quercus pubescens* in the northern districts of Lake Garda.**)
Planta, 1961, **56**: 607-17, bibl. 34.

Provided the water supply was optimal, olive trees assimilated more (64%) CO_2 per unit of dry weight during May to October than from November to April (36%). Assimilation was lowest in January, the nett assimilation figure being 1·7 mg. CO_2/g. dry wt./hr. at that time.—Bot. Inst., Univ. Innsbruck.

6950. Bonifacio, A., and Gudin, C.
Dépistage, sous lampe de Wood, de lésions causées par champignons phytopathogènes. (**Detection under Wood's lamp of lesions caused by phytopathogenic fungi.**)
C.R. Acad. Agric. Fr., 1961, **47**: 151-2, bibl. 5.

Esculetin and scopoletin, substances which are revealed by their blue fluorescence under Wood's lamp, can be isolated by paper chromatography from tissues showing blue fluorescence, i.e. those in the immediate neighbourhood of pathogenic fungi such as gloeosporium on banana and fusarium on gladiolus bulbs. As the fluorescent compounds accumulate from the beginning of infection, attack can be demonstrated before symptoms are visible in ordinary light. For example, under Wood's lamp, olive leaves infected with leaf spot (*Cycloconium oleaginum*) show blue fluorescence long before they develop the typical lesions.

Passion fruit.

6951. Pruthi, J. S., Srivastava, H. C., and Lal, G.
Microbiological spoilage in purple passion fruit (*Passiflora edulis* Sims.) during storage.
J. sci. industr. Res., India, Sect. C, 1958, **17C**: 129-31, bibl. 3.

In tests of various fungicidal treatments fruit storage in polythene bags treated with 5% lysol solution gave the best results. Loss in weight and wastage of fruit were 0·5% and 0·5% compared with 32·3% and 8%, respectively, for the controls. No effect was observed on the composition or quality of the juice extracted after 35 days' storage. Cent. Food technol. Res. Inst., Mysore.

6952. Pruthi, J. S.
Nutritive value and utilization of passion fruit waste (skin or rind) (*Passiflora edulis* Sims).
Food Sci., 1960, **9**: 397-9, bibl. 12, from *Trop. Abstr.*, 1961, **16**, Abstr. i1507.

The rind, which constitutes 50% of the total weight of the fruit, is a waste product of the fruit processing industry in India. Analyses showed that it contains 1 mg./g. of ascorbic acid on a fresh matter basis, and about 15% of dry matter containing 12–15% protein and 9–15% of high quality pectin. The rinds may be used as manure, as a source of pectin and as a constituent of cattle feeds.

Tung.

6953. Merrill, S., Jr., and Potter, G. F.
Resistance of shoots of tung varieties to injury from controlled low temperatures.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 270-7, bibl. 10.

In trials in Louisiana most varieties that were relatively free of injury in the spring suffered most in the autumn. The only exception, G-46, is not a heavy cropper, but is being used for hybridization with recommended varieties.

6954. Shear, C. B., and others.
Determining critical ranges in leaf contents of nutrient elements from changes in gradients along the axes of one-year-old tung trees.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 310-22, bibl. 30.

One-year-old tung trees were trained to different branching habits. Leaf samples, collected from 5 positions on the main trunk and from 3 positions on the laterals of those allowed to branch, were analysed for 10 nutrient elements. The contents of the individual elements in the leaves from the same position on the trunk differed with branching habit. No consistent relationship was found between the nutrient content of leaves from any one sampling position on the laterals of unpruned trees and any one sampling position on the trunks of pruned trees. The gradients in the concentrations of the individual elements from basal to terminal leaves on the trunk and laterals varied with soil type and branching habit. Analysis of the gradients for the different elements by means of linear regression support the following conclusion: The critical range of an element normally supplied as a cation (K, Ca, Mg, Cu, Fe, Mn and Zn) is that range in leaf content at which the gradient of that element from basal to terminal leaves shifts from positive to negative or negative to positive, as the case may be. This does not hold for elements usually supplied in the anion form (N, P and B). Evidence is presented which indicated that this method may be used to establish the critical range of nutrient elements in other plants. [From authors' summary.]—Exp. Tung Farm, White Sand, Miss.

6955. Neff, M. S., Barrows, H. L., and Shear, C. B.
Effects of time of applying fertilizers and levels of calcium and magnesium on growth and production of tung on Lakeland fine sand.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 278-86, bibl. 14.

The split application of fertilizer, i.e. in two or three doses, and the application of both dolomite and magnesium led to increased growth and yield and a reduction in leaf scorch. Split application, moreover, increased the number of fruits per terminal and tended to avert alternate bearing.—U.S.D.A., Cairo, Ga, and Bogalusa, La.

6956. Barrows, H. L., and Gammon, N., Jr.
Effect of soil type and zinc concentration on growth, nutrient uptake, and magnesium translocation of seedling tung trees.
Barrows, H. L., and others.
The responses of one-year-old tung trees to levels and placements of zinc sulfate as affected by soil type.
Proc. Amer. Soc. hort. Sci., 1960, **76**: 287-99, bibl. 19, and 300-9, bibl. 21.

Seedling tung trees were grown in crocks containing fine sand in which increasing concentrations of Zn had been incorporated. Maximum tree growth was obtained when the concentration of Zn in the leaves was between 0·41 and 0·77 me./100 g. Top growth was inhibited by concentrations of Zn lower than those which inhibited root growth. A possible explanation for the mechanisms involved in the Zn × Mg interaction observed is presented. This explanation involved the reactions of these two elements in the soil, on the root surface and within the root. [For the second paper, see *H.A.*, 30: 1209; see also *H.A.*, 31: 3222.]—U.S.D.A., Bogalusa, La, and several other centres.

6957. Bain, D. C.
Cercospora leaf spot of tung in Mississippi.
Plant Dis. Reptr, 1960, **44**: 190-1, bibl. 2, illus.

As inoculation tests have shown differences in the reactions of seedlings, the best means for controlling leaf spot (*Mycosphaerella aleuritidis*) is considered to be the breeding and selection of resistant varieties.—Miss. St. Univ.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 5784.)

6958. Santiago, A.
National forests of agricultural crops for the wet humid tropics.
Nature, 1961, **190**: 1070.

It is suggested that large, semi-wild areas of economic trees should be established, using species of *Durio*, *Nephelium*, *Bertholletia*, *Garcinia*, *Lansium*, *Baccaurea* and *Metroxylon*, etc. The virtues and means of establishing such areas are briefly discussed.—Dep. Agric., Malaya.

6959. Naik, K. C., Muthuswamy, S., and Raman, V. S.
Recent achievements in tropical fruit improvement in South India.
South Indian Hort., 1959, **7**: 3-11, bibl. 5.

Work on jack and bread fruit, the annonas, sapodilla, papaw, citrus and banana described.

6960. Hasselo, H. N.
The soils of the lower eastern slopes of the Cameroon mountain and their suitability for various perennial crops.
Thesis LandbHogesch. Wageningen, 1961, pp. 67, bibl. 51, illus. + coloured map.

The main soil types are young volcanic, old volcanic and marine alluvial soils, and the crops grown are bananas, oil palms, rubber, cacao and tea. The different soils vary greatly in their chemical status, but from a study of the growth, yield and diseases of the crops grown the main mineral deficiency is seen to be that of K, especially during the dry season and on young volcanic soils. N is the next most important deficient element, particularly on marine alluvial soils and during the rainy season. NPK fertilizers are best applied in a compound form, so that the various elements become available at the same time, and in ratios adapted to the different crops and soils. P fertilizers applied alone usually had no effect.

6961. Ronchaine, J.
Entretien en serres des principales plantes tropicales cultivées. (**Glasshouse culture of the principal cultivated tropical plants.**)
Ann. Gembl., 1960, **66**: 297-327, bibl. 17.

Following a review of the environmental factors involved the climates of several stations in the Congo are compared with that of Brussels, and the climatic and soil requirements of a wide range of tropical crops are given. Recommendations are then made on the culture in Belgium of 12 crops in: (1) an equatorial hot house (mean temperature 25° C.), e.g. *Elaeis guineensis*; (2) a temperate hot house (mean temperature 20° C.), e.g. *Aleurites* spp.; (3) a cold house (with heat at the beginning and end of the summer for annuals), e.g. several field crops; and (4) the open air, e.g. *Boehmeria nivea* and *Ricinus communis*.

6962. Hurov, H. R., and others.
Double stimulant polythene bag method of rooting cuttings. (Abstract and illustrated description.)
Pamphl. N. Borneo Dep. Agric. **11**, 1960, pp. 5 and 22, illus.

This method is claimed to be very successful for a large number of tropical woody species, nearly 80 of which are listed in the "abstract". The method consists in placing the cuttings for 12–24 hours in a "biologically active" solution. A number of these, of remarkable diversity ranging from Worcester sauce to ink, are listed in the "abstract". The cuttings are then given a quick IBA dip and set in a mixture of 80 parts decomposed rice husk and 20 parts fine river sand inside a 14 × 8 in. bag made of 0·02 mm. polythene. This is kept in 50% shade, and rooting, which can be seen through the base of the bag, takes place in 1–2 months.

6963. Kempanna, C., Lingaraj, D. S., and Chandrasekhariah, S. R.
Propagation of *Gliricidia maculata*, H.B. and K. by air layering with the aid of growth regulators.
Sci. and Cult., 1961, **27**: 85-6, bibl. 2, illus.

Rooting was best when hard rather than soft wood was used, and when a mixture of NAA plus IBA was applied to the cut bark rather than either regulator alone.—Agric. Coll., Bangalore.

6964. Hocombe, S. D.
Notes on a conference on the control of couch and other grasses in East African plantation crops, particularly with the use of dalapon.
Pestic. Abstr., Sect. C, 1960, **6**: 109-16.

In coffee, tea, sugar cane, sisal and pyrethrum.

6965. Kramer, M., and Leiderman, L.
Observações sôbre experiências em andamento para a eliminação da palmeira indaiá por meios químicos. (**Observations on experiments and procedure for the eradication of the indaiá palm by chemical means.**) [English summary $\frac{1}{3}$ p.]
Biológico, 1961, **27**: 33-6, illus.

Preliminary experiments in São Paulo, Brazil, on the eradication of *Attalea exigua* from pastures and plantations, showed 100% success within 30 days of treating the centre of the crown with 125 ml. of diesel oil containing 0·75% of the acid equivalent of 2,4,5-T ester. Almost equally good results were obtained with esters of 2,4-D and 2,4,5-T mixed at 0·9% in diesel oil. Little or no effect was obtained with ammonium sulphamate, monuron, a mixture of chlorobenzoic acids or diesel oil alone.

Areca palms.

6966. INDIAN CENTRAL ARECANUT COMMITTEE.
Eleventh Annual Report 1959-1960, pp. 123.
Research is conducted at the Central Research Station, Vittal, and at 7 Regional Research Stations. Seed nuts were most viable when sown within 3 weeks of harvesting. In an NPK experiment significant responses were obtained only to N, and 75 lb. N per acre proved to be an economic level. Of 8 proprietary fungicides Micro-cop, Coppesan and Fytolan proved the most effective against koleroga disease. A number of other experiments, agricultural and technological, were started, but were not far enough advanced for conclusions to be drawn.

6967. MURTHY, K. N., AND BAVAPPA, K. V. A.
Morphology of arecanut palm—the shoot.
Arecanut J., 1960, **11**: 99-102, bibl. 2, illus.
Stem girth is greatest in the young palm, gradually tapering with increasing age. The anatomy of the leaf and fruit and the phyllotaxy are described. —Cent. Arecanut Res. Stat., Vittal.

6968. BIDDAPPA, K. G.
Utilisation of arecanut waste.
Arecanut J., 1960, **11**: 106-8, bibl. 3.
The uses to which husk, root, bark, leaf and leaf sheath may be put are briefly described, with data on the N, P and K contents of husk and leaf.

Bananas.

(*See also* 5781, 6478, 6479, 6950, 7266, 7271, 7289.)

6969. FAO.
Report of the first FAO/CCTA international meeting on banana production.
FAO Mtg Rep. **PL/11**, 1960, pp. 27.
The meeting was held at Abidjan in the Ivory Coast in 1960, and this report briefly outlines discussions on banana production, varieties and breeding, ecology, cultural practices, pest and disease control, transport and ripening.

6970. QUEENSLAND DEP. AGRIC. STOCK, HORTICULTURE BRANCH.
Banana growing in Queensland.
Qd agric. J., 1961, **87**: 125-32, 165-71, illus.
Varieties, site selection and preparation, planting, culture, harvesting, transport and methods of eradication.

6971. MONNET, J.
Comparaison de quelques variétés de bananiers. (**A comparison of certain banana varieties.**)
Fruits d'Outre Mer, 1961, **16**: 74-6.
Of the 7 varieties compared in French Guinea, Grande Naine gave the highest yield, but the bunches needed careful packing for transport. Sérédou, with approximately 25% lower yield, produced compact bunches needing only a polythene wrapping for transport. Attempts are being made to produce hybrids combining the low stature (and consequent wind resistance) of the Nain and Grande Naine types with the higher productivity of the tall varieties.

6972. GOWDER, R. B., AND NAMBISAN, K. M. P.
A note on the banana variety Matti of Kanyakumari District.
South Indian Hort., 1959, **7**: 20-1, bibl. 3.
A local type of *Musa acuminata* described.

6973. OPPENHEIMER, C., AND GOTTREICH, M.
Studies on growth and development of the dwarf banana in the coastal plain of Israel. VI. The influence of different planting distances on time of flowering, yield and harvest distribution during the first three growing seasons.
Ktavim, 1960, **10**: 173-8, bibl. 10.
In this trial spacing between rows was uniform at 3 m., and spacing within rows varied between 2·5 and 4·0 m. Differential thinning was planned to give spaces of 4·9 to 6 sq. m. per bunch from the 2nd year onwards, but the actual space for the 2nd and 3rd years was 5·2 to 6·5 sq. m. Wider spacing than the usual 2·5 m., with 2 bunches per stool, produced a somewhat larger harvest, with much improved distribution. The widest spacing resulted in some loss of yield, but a still better distribution. At the normal flowering time the mean number of leaves was 37 in the 2nd year and 41 in the 3rd year. Thus more leaves (a longer period) are needed in the 3rd year between sucker emergence and flowering. Wider spacing makes the leaves unfurl more frequently during autumn, winter and spring, and thus results in earlier flowering, as compared with closer spacing. [From authors' summary. For part V, see *H.A.*, 30: 1221.]

6974. MONNET, J., LOSSOIS, P., AND CHAMPION, J.
Influence de la préparation du terrain sur le rendement d'une bananeraie. (**The effect of soil preparation on the yield of a banana plantation.**)
Fruits d'Outre Mer, 1961, **16**: 77-8.
Planting holes 60 cm. deep were better than 40 cm. Placing compost in the deeper holes did not affect yields. The sucker from the axil of the 18th or adjacent leaf proved suitable for replacement growth.

6975. SUBRA, P., AND GUILLEMOT, J.
Contribution à l'étude du rhizome et des rejets du bananier. (**A contribution to the study of banana rhizomes and suckers.**)
Fruits d'Outre Mer, 1961, **16**: 19-23, illus.
This work was carried out in Martinique, mainly

on the banana varieties Poyo and Grande Naine. The rhizomes were more cylindrical and formed at deeper levels in coarse than in powdery (volcanic ash) soil. Maiden rhizomes planted at a depth of 40–60 cm. always worked upwards during growth. Ridging resulted in a lateral flattening of the rhizome, but the effect on root production was not very marked and the active roots were still confined to the collar region. If axial suckers (i.e. those on the opposite side from the original sucker) are selected to carry on the growth from the 2nd cycle onward, the rhizome will not readily become exposed, and this measure, in combination with uniform orientation along the furrows when planting, will facilitate cultivation. The emission and morphology of lateral and terminal suckers are described.—Inst. franç. Rech. fruit. O.M.

6976. Barker, W. G., and Dickson, D. E.
Early flower initiation in the banana.
Nature, 1961, **190**: 1131-2, bibl. 8, illus.

A number of suckers obtained by a rapid multiplication method [see *H.A.*, 30: 2811] flowered when only 2–3 ft. tall and after the production of only 7 or fewer leaves. These were of the variety Cocos, a dwarf sport of Gros Michel. The possible causes and implications of this premature development are discussed.—Tela Railroad Co., La Lima, Honduras.

6977. Chorin, M., and Rotem, J.
The flower types of the Cavendish banana in Israel.
Ktavim, 1960, **10**: 165-71, bibl. 5, illus.

Bananas were found to bear, on the same inflorescence, 2 distinct types of pistillate flower, which differ in the rate of withering of the perianths, staminodes and style. The floral parts of the caducous type of flower wither rapidly, as early as 5–7 days after bloom, whereas those of the persistent type wither gradually 20–30 days after flowering. Generally, clusters bear flowers of only one type, but occasionally composite clusters are found. [From authors' summary.]

6978. Dorairaj, M. S., and David, B. V.
Floral abnormalities in the culinary banana variety Monthan.
Madras agric. J., 1961, **48**: 58-9, bibl. 1, illus.

Nine abnormalities noted.

6979. McGahan, M. W.
Studies on the seed of banana. I. Anatomy of the seed and embryo of *Musa balbisiana*.
Amer. J. Bot., 1961, **48**: 230-8, bibl. 28, illus.

6980. Calpouzos, L., and others.
Relation of petroleum oil composition to phytotoxicity and sigatoka disease control on banana leaves.
Phytopathology, 1961, **51**: 317-21, bibl. 12.

The saturated, aromatic, and non-hydrocarbon fractions from heavy paraffinic, light paraffinic, heavy naphthenic, and light naphthenic oils were sprayed 4 times at 2-week intervals on banana leaves at low-volume deposit rates not exceeding 2·1 mg. of oil/100 sq. cm. of leaf surface. The saturated fractions from the first 3 oils gave control of sigatoka disease, but they caused phytotoxic leaf flecking, whereas the saturated fraction from the light naphthenic oil caused almost no flecking and gave good disease control. The aromatic and non-hydrocarbon fractions from the 4 oils caused little or no leaf flecking but gave no appreciable control of the disease. When a saturated and an aromatic fraction were compared at deposit rates of 2·1, 4·2, 8·4, and 16·8 mg./100 sq.cm. respectively, the saturated fraction caused considerable flecking at all deposit levels, whereas the aromatic fraction did so only at the 3 higher rates. At the first 3 rates the saturated fraction gave better disease control, but at 16·8 mg. both fractions gave about equal control. It is suggested that the development of improved spray oils for bananas requires further studies using known low-volume deposit rates and giving emphasis to the testing of saturated fractions from light naphthenic oils. —[Authors' summary. For earlier work see *H.A.*, 31: 5276.]—U.S.D.A., Mayagüez, P.R.

6981. Calpouzos, L., and others.
Evidence of fungistatic action of petroleum oil against *Mycosphaerella musicola* inside banana leaves.
Phytopathology, 1950, **50**: 865-6, bibl. 2.

The oil controlled the disease after the pathogen had already entered the leaf, but after 7 weeks inside an oil-treated leaf at least some of the fungus remained alive and inherently pathogenic.—U.S.D.A., Mayagüez, P.R.

6982. Evans, E., Bevington, H. L. S., and Whitaker, E. P.
Significance of the anti-sporulation effect of copper fungicides in the control of sigatoka disease of bananas caused by *Mycosphaerella musicola* Leach.
Nature, 1961, **191**: 476-8, bibl. 6.

Experiments with infected leaf segments sprayed with fungicides showed that copper oxychloride, zineb and a combination of the two markedly reduced conidial production. In field tests 3½ lb. copper oxychloride in 1 gal./acre also had this effect, but with a delay of several months before treatment became effective, which suggests that the copper fungicide acted primarily as an anti-sporulating agent. In an experiment in which the crop was cut down and the regrowth sprayed the response to spraying was almost immediate.—Fisons Pest Control Ltd.

6983. Klein, H. H.
Effects of fungicides, oil, and fungicide-oil-water emulsions on development of cercospora leaf spot of bananas in the field.
Phytopathology, 1961, **51**: 294-7, bibl. 7.

Fungicides were protectant and anti-sporulant, whereas oil arrested further development of yellow streaks. In fungicide–oil–water emulsions the fungicide component did not affect the oil action, and oil did not affect the fungicide other than to improve coverage in the field. There were fewer yellow streaks in fungicide- than in oil-treated plots, but fungicide–oil–water emulsion plots had the fewest yellow streaks. In anti-sporulant studies the majority of conidia formed on the upper spot surfaces of untreated and oil-sprayed leaves; in all fungicide treatments the majority of conidia formed on the lower spot surfaces. [From author's summary. For earlier work see *H.A.*, 31: 1382.]—Tela Railroad Co., La Lima, Honduras.

6984. Stotzky, G., and others.
Soil mineralogy as factor in spread of fusarium wilt of banana.
Science, 1961, **133**: 1483-5, bibl. 7.

Montmorillonoid-type clay minerals occurred in all soils in which disease spread was slow, but, with the exception of two soils, this group of minerals was absent in soils in which it was rapid. [From authors' abstract.]—United Fruit Co., Norwood, Mass.

6985. Booth, C.
Black-cross, a newly recorded disease of bananas.
Commonw. phytopath. News, 1961, **7**: 23, illus.

Symptoms of a disease associated with the fungus *Phyllachora* sp.

6986. Meredith, D. S.
Banana fruit-spot caused by *Deightoniella torulosa* (Syd.) Ell.
Control of banana fruit-spot ("speckle") caused by *Deightoniella torulosa* (Syd.) Ell.
Plant Dis. Reptr, 1960, **44**: 618-21, bibl. 12, illus., and 808, bibl. 5.
Fruit-spot ("speckle") of Jamaican bananas caused by *Deightoniella torulosa* (Syd.) Ellis. I. Symptoms of disease and studies on pathogenicity. II. Factors affecting spore germination and infection.
Trans. Brit. mycol. Soc., 1961, **44**: 95-104, bibl. 21, illus., and 265-84, bibl. 19, illus.

Including a suggestion that the removal of dead or dying banana trash from the plantation will appreciably reduce the disease. [See also *H.A.*, 31: 1385.]

6987. Minz, G., Ziv, D., and Strich-Harari, D.
Decline of banana plantations caused by spiral nematodes, in the Jordan Valley, and its control by DBCP.
Ktavim, 1960, **10**: 147-57, bibl. 17, illus.

The nematode, *Helicotylenchus multicinctus*, may be the major factor in the decline. It is introduced into new plantations by infected planting material. Symptoms of nematode injury are necrotic lesions on the roots. Fumigation by 1,2-dibromo-3-chloropropane (DBCP), generally at 10 l. per dunam, applied with large quantities of irrigation water gave effective control, and by repeated fumigation of newly established plantations it is hoped to obtain nematode-free planting material.

Cacao—general.

6988. Inter-American Cacao Conference.
Séptima Conferencia Interamericana de Cacao, Palmira, Colombia, 1958, Minist, Agric. Colombia, [? 1960], pp. 606, bibls, illus.
Proceedings of the VIII Inter-American Cacao Conference, Trinidad and Tobago, 1960, [1961], Govt. Press, Trinidad, pp. 513, bibls, illus.

The published proceedings of the 1958 conference, held in Colombia, contains some 70 papers and that of the 1960 conference, held in Trinidad, 53 papers. Most of the papers dealing with agricultural aspects of caçao growing are abstracted below.

6989. U.S. Dep. Agric., Foreign Agricultural Service.
Cocoa bean crop sets record.
Foreign Agric. Circ. U.S. Dep. Agric. **FCB 1-61**, 1961, pp. 14.

1960-61 world crop now estimated at 2,530 m. lb., 13% above the previous record of 1959-60.

6990. W.A.C.R.I.
Annual Report of the West African Cocoa Research Institute, 1959-60, 1961, pp. 91, illus., 5s.

Tafo Station: Striking differences in tolerance to *Phytophthora palmivora* were again shown in the 2nd clonal trials, D70 and U6 showing less than 10% of black pods. The use of dieldrin spray to control mealybug has led to a pronounced increase in the populations of certain pests of cacao through the destruction of their natural predators. Endrin has proved superior to BHC for the control of capsids. For amelonado cacao 7½ × 7½ ft. spacing again proved the best and for Amazon, 10 × 10 ft. Shade removal and the application of mixed fertilizer continued markedly to increase yields. Significant responses to P were obtained in several experiments. Studies on a gall disease are also reported. *Ibadan Station:* Correlations between yield, girth and duration of swollen shoot infection were worked out for the Koroboto plot. Light shade resulted in better seedling growth in the nursery than either heavy or no shade.

6991. Guerrero, M., R.
Algunos estudios agrológicos de areas cacaoteras actuales o potenciales en Colombia. **(Some agrological studies of present and potential cacao areas in Colombia.)** [English summary ½ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 414-29, bibl. 33.

Investigations on climate, soils, water supply and other factors failed to reveal any new areas suitable for immediate large-scale cacao development.

Cacao—selection, propagation and planting.

(*See also* 7036, 7040, 7041.)

6992. Ruinard, J.
Variability of various pod characters as a factor in cacao selection. [Dutch summary ¾ p.]
Euphytica, 1961, **10**: 134-46, bibl. 3.

A new method proposed for determining the annual wet bean production of a cacao tree in a seedling population is to multiply the total weight of the pods harvested from it by the average quotient of wet bean weight/pod weight from 20 of these pods selected as being of average weight. The results are considered to be more accurate than those from the method current in Dutch New Guinea, in which the number of pods harvested is multiplied by the average wet bean weight per pod, derived from 20 average-sized pods.—Agric. Res. Stat., Manokwari, Neth. New Guinea.

6993. Ruinard, J.
Waarnemingen in de Wageningen-cacaopopulatie in het vierde lavensjaar van de aanplant. **(Observations on the Wageningen cacao seedlings during their 4th year from planting).** [English summary.]
Meded. Landbouwk. Proefst. Ned. Nw Guinea, 1960(1), 1960, **5**: 1-8, bibl. 1, from *Trop. Abstr.*, 1961, **16**, Abstr. i-580.

In 1955 2 cacao pods were obtained at Wageningen from the cross (Getas 8 × Djatiroenggo 38) × (DR 38 × G8), and sent to Netherlands New Guinea, where 60 seedlings were planted. In the 4th year the mean yield was 111 pods per tree, corresponding to 1,400 kg. dry cacao/ha. Yields of individual trees in 1958/59 were not closely correlated with yields in 1957/58. Trees with a stem girth above the average had a higher mean yield than slimmer trees. Trees which produced a number of pods above the average had a lower mean weight of wet cacao per pod than the remaining trees.

6994. Soria, J., and Paredes, L. A.
Rendimientos de estacas, de progenies de semillas de clones UF y de semillas no seleccionadas de cacao. **(Yields from cacao cuttings, from progenies of seed of UF clones and from unselected seed.)** [English summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 379-89, bibl. 5.

Yields were significantly higher from UF clones propagated by cuttings than from seedlings of these clones obtained by open pollination. Yields from the latter were consistently, but not significantly, higher than those from unselected seedlings of the local Costa Rican variety Matina.—Inst. interamer. Cien, agríc., Turrialba, C.R.

6995. Jolly, A. L., and de Verteuil, L. L.
Clonal and fertilizer experiments in Trinidad and Tobago. [Spanish summary ¾ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 390-418, bibl. 7.

In 12 first-line and 11 second-line clonal experiments 9 clones of Amazonian origin, including IMC 67, outyielded ICS 95. In 9 fertilizer trials significant responses were very infrequent.—Imp. Coll. trop. Agric., Trinidad.

6996. Hunter, J. R.
Germination in *Theobroma cacao*.
Cacao, Turrialba, 1959, **4**(4): 1-8, bibl. 7.

Cacao seeds need to be kept at 100% R.H. to retain their viability, which rapidly decreases in proportion to the dryness of the air. They cannot be stored for long even at moderately low or high temperatures without loss. They can, however, be kept viable for at least 2 months provided they have a moisture content of approximately 50% and the temperature is between 18° C. and 30° C., and also if they are kept free from fungal attack.

6997. Hansen, A. J., and Hunter, J. R.
A preliminary experiment on the protection of cacao seeds.
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 121-4, bibl. 5.

Of 10 fungicides tested only captan failed to increase the viability of mature cacao seeds after 30 days' storage; Ceresan treatment resulted in the most viable seeds after 60 days' storage. Some phytotoxic effects were noted.—Inter-Amer. Inst. agric. Sci., Turrialba, C.R.

6998. Monge S., F.
Nota sobre la sensibilidad del cacao a las radiaciones gamma y su relación con el daño causado en el nucleo celular. **(A note on the sensitivity of cacao to gamma rays, and its relation to injury of cell nuclei.)** [English summary 8 lines.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 419-22.

Seeds of 4 selected cacao clones and of the local Costa Rican variety Matina were subjected to various intensities of gamma rays. The 50% lethal dose was highest in UF-613 (9,500 r) and lowest in Matina (7,500 r), which was the type most severely checked in growth. At 2,000 r, however, Matina recovered within 2 hours of irradiation, whereas in UF-613 the extent of recovery in this period was insignificant.

6999. ANLÉU, L. [W.]
Propagador tipo Guatemala. (**The Guatemala-type propagator.**)
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 138-41, bibl. 3, illus.
Nuevo propagador para cacao. (**A new cacao propagator.**) [English summary 7 lines.]
Invest. agropec., Guatemala, 1960, **1**: 90-4, bibl. 3, illus.

The frame was constructed from 1 × 2½ in. wood and polythene sheeting. Its base measured 3·6 × 1·56 m., and 2 lids were hinged along the central ridge which was 0·96 m. high. With 4 mist nozzles operating for 5 min. of each hour, and a temperature range of 22–31° C., the percentage rooting of cacao cuttings was 85–90. The cuttings were treated with IBA and Phygon, their bases were enclosed in black plastic bags, 264 to a frame, and the light intensity was reduced to 45–47·5% by a roof, made partly of zinc sheeting and partly of white plastic, over the frames.—Inst. agropec. nac., Guatemala.

7000. LIABEUF, J.
Étude des méthodes de multiplication des clones de cacaoyers selectionnés à la Station de Nkoemvone. (**Study of methods of multiplication of selected cacao clones at Nkoemvone Station [Cameroons].** [Spanish and English summaries ½ and ¼ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 524-33.

In the normal method of propagation cuttings are struck in translucent Alkathene [polythene] pots filled with sawdust enriched with organic manure and placed in concrete propagating bins. After 6 weeks the lights are removed and the cuttings are hardened for a week. A cutting in its pot weighs only 150 g. and is easily transportable. On removal from the propagating bin the rooted cuttings are ball-planted either in baskets or in 1-litre Alkathene pots and held in a shaded nursery until large enough for planting out after 6–12 months. Cuttings required for multiplication are planted in double lines and in 6 years one cutting provides 127–165 further cuttings. The production of cuttings from budded chupons of adult trees is also described. By this method 8-year-old trees of low yield are cut back to 20 cm. After 6 weeks the resulting chupons are 50 cm. tall. All are removed except 3, and 2 of these are budded by the inverted-T method near their base. The budded chupons are progressively shortened to a point just above the bud, which grows out very rapidly. The first cuttings can be taken after 11 months. Buddings on 2 chupons treated in November 1956 had provided 186 cuttings by April 1958.—Stat. Cacaoyer, Nkoemvone.

7001. ZAVALA M., C., AND BULLARD, E. T.
Rooting cacao clones using various concentrations of indole butyric acid and fungicides. [Spanish summary 13 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 546-52, bibl. 2.

In experiments at Pichilingüe, Ecuador, with two introduced and two shy-rooting clones, Fermate was the best of three fungicides tested, and the best concentrations of IBA were 1·0 and 1·2%, except for the very shy-rooting SR 7 which required 1·4%.

7002. ANLÉU, L. W.
El uso de la tela milimetrada en almácigos de cacao. (**The use of millimetre-mesh netting in cacao nurseries.**) [English summary ½ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 142-3.

Green plastic netting, used to shade cacao nurseries in Trinidad and Guatemala, advanced the production of rootstocks by 4–6 months compared with other types of shade, protected the plants from rain injury and promoted very vigorous growth. Although costly, the netting proved economic and durable.—Inst. agropec. nac., Guatemala.

7003 HUNTER, J. R., AND CAMACHO V., E.
A comparison of four transplanting systems with cacao. [Spanish summary ½ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 144-52, bibl. 7, illus.

The methods compared were: (1) stumping the plants back to 30 cm. 1 week prior to transplanting; (2) covering with a spray of plastic resin; (3) removing the leaves 1 week before transplanting; and (4) covering with polythene bags. Provided the transplants were given 50% shade, those covered with polythene bags were the most vigorous, but the method was expensive. The least expensive and easiest method was cutting back a week before transplanting.—Inter-Amer. Inst. agric. Sci., Turrialba, C.R.

7004. GUTIÉRREZ G., J., AND BULLARD, E. T.
Propagación de cacao: comparación entre ramillas e injertos con relación a tres distancias de siembra. (**Cacao propagation: a comparison of cuttings and grafts in relation to three spacings.**) [English summary ⅓ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 132-7, bibl. 4.

Cuttings and wedge-grafted plants (on seedling rootstocks) of the clone EET-19 were established in an experimental cacao plantation in Ecuador, with spacings of 2 × 5, 3 × 5 and 4 × 5 m. During the 7 years of observation there was no significant difference in yield or in *Monilia* infection attributable to the propagation method. In the 5th year, witches' broom was more prevalent in the plants grown from cuttings than in those grafted. In 3 of the years the yield was highest at the 2 × 5 m. spacing. The incidence of the 2 diseases was not affected by spacing.—Estac. exp. trop. Pichilingüe.

Cacao—soil management and nutrition.

7005. HARDY, F.
Some relationships between soil and air temperatures in a cacao field. [Spanish summary $\frac{3}{4}$ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 304-12, bibl. 2.

Data are presented showing the air and soil temperatures for 79 weeks on a cacao estate in a bare plot, a plot covered with litter, and a plot given a bagasse mulch. A grass plot elsewhere was also included in the investigation. The litter and mulch practically eliminated the daily temperature fluctuation in the underlying soil.—Imp. Coll. trop. Agric., Trinidad.

7006. MALIPHANT, G. K.
Cultural and manurial experiments, River Estate—a review. [Spanish summary $\frac{1}{2}$ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 319-29.

The appreciable increases in yield obtained by the application of N, P and K were affected by associated factors, such as single or combined fertilizers, annual or bi-annual application, shade conditions and spacing. The most effective shade tree was *Erythrina poeppigiana*. Grass mulches gave greater yields than those given by equivalent amounts of chemical fertilizers but at greater cost. Annual forking and ploughing, however, reduced yields.—Imp. Coll. trop. Agric., Trinidad.

7007. CUNNINGHAM, R. K., SMITH, R. W., AND HURD, R. G.
A cocoa shade and manurial experiment at the West African Cocoa Research Institute, Ghana. II. Second and third years.
HURD, R. G., AND CUNNINGHAM, R. K.
Idem. III. Physiological results.
J. hort. Sci., 1961, **36**: 116-25, bibl. 7, and 126-37, bibl. 21.

A mineral nutrient balance sheet is given in the first paper. Provided other growth-limiting factors are not operative, yields are highest without shade; more fertilizer is required, but the drain of nutrients from the soil is only excessive if yields approach 2,000 lb. dry cacao/acre. The second paper indicates that the increased yields obtained after shade removal and fertilizer application are associated with increased vegetative growth, flowering, and setting and wilting of young pods. The rhythm of flushing and flowering is intensified, but its periodicity is not affected. Percentage cherelle wilt, however, remains unchanged. Fertilizers are best applied at the beginning of the main rains, with possibly a later foliar application to the developing crop. [For part I, see *H.A.*, 29: 1982k.]

7008. HOMÈS, M. V.
Mineral fertilizers for cocoa as deduced from the use of a test plant. [Spanish summary 6 lines.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 355-62, bibl. 2.

The author's "method of systematic variations", as applied to cacao.

7009. LOUÉ, A., VERLIÈRE, G., AND LE LAY, —.
Recherches sur la nutrition minérale et la fertilisation du cacaoyer, et étude des sols à cacaoyers de Côte d'Ivoire. (**Investigations on the mineral nutrition and manuring of cacao and a study of the Ivory Coast cacao soils.**) [English and Spanish summaries $\frac{1}{2}$ p. each.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 334-44.

Cacao seedlings of the amelonado type grown in sand cultures did not show P-deficiency symptoms until after 8 months. Deficiences of K, Mg, Fe, Mn and B were evident between the 3rd and 5th months, with severe symptoms in the case of Mg. Symptoms of N, S and Ca deficiences began to appear in the 3rd month. [See also *H.A.*, 30: 6158.]—Cent. Rech. Inst. franç. Café Cacao, Côte d'Ivoire.

7010. MACHICADO, M., AND HAVORD, G.
La nutrición mineral del cacao. Algunos resultados preliminares del análisis químico de hojas de cacao. (**Mineral nutrition of cacao. Some preliminary results from the chemical analysis of leaves.**) [English summary 11 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 445-75, bibl. 3.

In trials in Costa Rica chemical analyses were made of leaves from the following comparative treatments: (1) monthly foliar spraying with urea plus bordeaux mixture *vs.* two soil applications of urea, (2) NPK fertilization under shade or in sunlight, (3) sampling leaves of different age, position, etc. There were differences due to treatment, but only at certain times of year. Composition varied widely from month to month.—Inst. interamer. Cienc. agríc., Turrialba.

7011. MACHICADO, M., AND BOYNTON, D.
Effect of three nitrogen sources and two light intensities on the nitrogen constituents of cocoa seedling leaves of three different ages. [Spanish summary $\frac{1}{3}$ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 345-54, bibl. 10.

In greenhouse experiments at Cornell University, young leaves contained less soluble N than older leaves. The leaves of plants receiving urea contained more N, both total and soluble, than those receiving ammonium- or nitrate-N. Both half-light and ammonium-N resulted in lower dry weights.—Cornell Univ., Ithaca, N.Y.

7012. SILLER, L. R.
Efecto de la urea, del zinc y del caldo bordelés en aspersiones foliares en cacao. (**Effect on cacao of urea, zinc and bordeaux mixture foliar sprays.**) [English summary 5 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 187-91, bibl. 3.

In a trial in Costa Rica bordeaux mixture alone, bordeaux plus urea, bordeaux plus zinc sulphate, and bordeaux plus urea plus zinc sulphate were applied every 45 days between 1 June, 1954, and mid-May, 1957, the urea and zinc sulphate being used at 15 and 10 lb., respectively, per 300 gal. bordeaux mixture. The average numbers of mature pods harvested per tree per annum were 53, 56, 61 and 63, respectively. The percentage of infected pods (*Phytophthora palmivora*) per tree ranged from 2·0 to 2·4. The small but constant increase given by Zn was considered to indicate Zn deficiency.—Inst. interamer. Cienc. agríc., Turrialba.

Cacao—environment, growth and reproduction.

(*See also* 7025.)

7013. DE ALMEIDA, C. R. M., AND MORAES, A. DE M.
O ciclo vegetativo do cacaueiro nas suas relações com algumas determinantes do meio aereo. (**The growing cycle of cacao in relation to some climatic factors.**)
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 339-46, bibl. 7.

An attempt is made to correlate cacao yields with mean monthly rainfall and temperature at 3 localities at different altitudes in São Tomé.

7014. NAVARRETE-SÁNCHEZ, C.
Doce meses de evapotranspiración potencial en cacao. (**Twelve months of potential evapotranspiration in cacao.**) [English summary 9 lines.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 313-18, bibl. 4.

Data from Palmira, Colombia, show no correlation between rainfall and the potential evapotranspiration of cacao over a 12-month period, during which 67% of the water requirement was supplied by rainfall. Differences in monthly values for potential evapotranspiration were highly significant. [See also *H.A.*, 31: 3268.]—Univ. cent. Venezuela, Maracay.

7015. PIRINGER, A. A., AND DOWNS, R. J.
Effects of photoperiod and kind of supplemental light on the growth of *Theobroma cacao*. [Spanish summary $\frac{1}{2}$ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 82-90, bibl. 11, illus.

For 18 months seedlings were subjected to photoperiods of 8, 12, 12 with 1 hour's light interruption around midnight, 14, 16 and 24 hours of which 8 hours were daylight and the remainder low intensity incandescent light. An additional 16-hour daylength including 8 hours of fluorescent light was also tested. The 8-hour plants had the shortest stems, the 16-hour plants the longest, and those given 14, 16 and the interrupted 12 hours jorquetted earlier. Plants given 16 hours of which 8 hours were under fluorescent light had the short stems of short-day plants but jorquetted early like the long-day plants. Continuous light reduced growth. Interrupting the night had the same effect as increasing the day length.—U.S.D.A., Beltsville, Md.

7016. VILLAFUERTE P., J.
Comparación de podas en cacao clonal. (**Comparison of pruning methods in clonal cacao.**) [English summary 9 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 395-8.
CABRERA ORTIZ, J., AND BULLARD, E. T.
Resultados preliminares sobre el efecto de tres sistemas de poda en cacao clonal. (**Preliminary results on the effects of three pruning systems on clonal cacao.**) [English summary $\frac{1}{4}$ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 126-31.

An investigation was made in Ecuador of the effects on production and disease incidence in young trees of 3 pruning methods, viz. heavy (removal of chupons and lower and secondary branches for the lower two-thirds of the tree), light (removal of the same for the lower one-third of the tree) and one-stemmed trees obtained from one chupon. Heavy and light pruning resulted in higher yields and greater susceptibility to *Marasmius perniciosus* and *Monilia roreri*. Of the 3 varieties tested clone EET-162 gave the highest bean yield and EET-212 was most resistant to *Marasmius*.

In the later paper, which covers a further 2 years, pruning is said not to have effected disease incidence. Clone EET-162 still yielded best, and it had less *Marasmius* but more *Monilia* infection than EET-48.—Estac. exp. trop., Pichilingüe.

7017. Varas A., J., and Bullard, E. T.
Efecto del almacenaje sobre la viabilidad del polen de cacao. (**The effect of storage on the viability of cacao pollen.**) [English summary 6 lines.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 92-9, bibl. 5.

Flowers and buds of cacao were stored with their stalks in water, or were kept at different temperatures in corked tubes containing either calcium chloride or cotton wool. The 2 best methods were keeping flowers with calcium chloride at 5° C., and with cotton wool at —20° C. In both cases pollination tests carried out after 7 days' storage were 50% successful. For shorter periods of storage (3–4 days) good results were obtained by keeping the buds with their stalks in water.—Estac. exp. trop. Pichilingüe, Ecuador.

7018. Hurtado, C. A.
Efectos de la polinización controlada sobre la producción del cacao. (**The effects of artificial pollination on cacao production.**) [English summary ⅓ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 109-15, bibl. 5, illus., and *Bol. Estac. exp. agríc. Tingo Maria* **14**, 1960, pp. 6, bibl. 5, illus.

The results of compatibility studies are tabulated for a number of Peruvian clones. In comparing natural and hand pollination the latter method increased fruit setting by about 3 times and also increased fruit weight. Fruit size was not affected, but there was a slight tendency towards thinner shells and higher numbers of seeds in pods formed from hand pollination. The clone Pound-12 was self-incompatible and also incompatible with Pound-7.

7019. Schroeder, C. A.
Observations on the growth of cacao fruit. [Spanish summary ½ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 381-94, bibl. 13, illus.

In investigations on Clone 650 at 2 places in Costa Rica from February to August, 1957, pod length and diameter were measured every other day and pod fresh weight, seed number and seed dry weight were eventually determined. Results are presented.

7020. Nichols, R.
Auxins of cacao and cherelle wilt. [Spanish summary ⅓ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 100-5, bibl. 8.

An inverse relationship was found between the wilt index and the concentration of endogenous growth substances detected in cacao, suggesting that wilt initiation might be controlled by these compounds.—Imp. Coll. trop. Agric., Trinidad.

7021. Navarrete S., C.
Resultados preliminares sobre los efectos de algunas sustancias químicas en el marchitamiento de los frutos y crecimiento del cacaotero. (**Preliminary investigations on the effects of some chemical substances on cherelle wilt and on growth in cacao trees.**) [English summary ¼ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 347-59, bibl. 7.

In a replicated trial carried out on young S.C.P.5 and S.C.P.6 cacao in Colombia the following treatments were applied fortnightly, beginning in January: sugar solution, urea, urea plus dieldrin, urea plus Cu fungicide, urea plus dieldrin plus Cu fungicide. There were no significant differences in height or incidence of wilt by April, but sugar and urea were the most promising treatments.—Campaña nac. Cacao, Valle.

Cacao—diseases and pests.

(*See also* 7012, 7016, 7020, 7021.)

7022. Hutchins, L. M., and Siller, L. R.
Cushion gall types in cacao. [Spanish summary ⅓ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 281-9, bibl. 15, illus.

Descriptions and illustrations are given of the 5 types of cushion gall now distinguished, namely, greenpoint, flowery, knob, disc and fan galls. Of these the first 2 are the most important and most widely distributed.—Inter-Amer. Inst. agric. Sci., Turrialba, C.R.

7023. Goberdhan, L., and Ganpat, D.
Cushion gall of cocoa in Trinidad. [Spanish summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin, Tob., 1960, [1961], pp. 270-80, bibl. 8.

Greenpoint type only, found on many clones and in all cacao-growing areas.

7024. Alvarado, R., Ampuero [P.], E., and Doak, K. D.
Reacción de diferentes clones y progenies híbridas a la buba o cushion gall del cacao. (**Reactions of different cacao clones and hybrid progenies to cushion gall.**) [English summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 290-301, bibl. 10.

Preliminary results of resistance tests in Ecuador are given, and the most susceptible clones and hybrids are listed. In some instances the disease appeared in hybrids from apparently resistant parents.—Estac. exp. trop. Pichilingüe.

7025. Soria, J.
A note on the relationships between flowery cushion gall, self-incompatibility and flower development. [Spanish summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 267-9.

Although fruit rarely develops on flowery galls, a high percentage of fruit set was obtained when such flowers were hand pollinated. The fruit made normal development and the seed germinated normally.—Inter-Amer. Inst. agric. Sci., Turrialba, C.R.

7026. Gorenz, A. M.
Transmission of the cushion gall disease of cacao. [Spanish summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 249-54, bibl. 3.

Infected bark grafted on healthy trees induced greenpoint galls in 2 out of 3 trees tested, at or below the graft, indicating the possibility of transmission through the phloem and by harvesting tools.—Estac. exp. agropec. "La Calera", Nicaragua.

7027. Siller, L. R.
An attempt to transmit cushion gall of cacao by bud grafting and the effect of malathion on gall development. [Spanish summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 263-6.

The effect of bud-grafting with infected budwood was masked by a large increase in cushion gall incidence in the plantation, but malathion treatment, although not controlling the gall on the original trees, had a marked effect in reducing gall incidence on the new growth from the buds. Most of the galls which developed in the absence of insecticide were greenpoint galls.—Inter-Amer. Inst. agric. Sci., Turrialba.

7028. Guadalupe Escamilla S., J.
La buba del cacao. **(Cushion gall of cacao.)** [English and French summaries.]
Bull. Inst. Invest. agríc. Méx., 1960, pp. 16, illus., from *Trop. Abstr.*, 1961, **16**, Abstr. i 1412.

Cushion gall was first observed in Mexico in 1958; since then it has reduced the yield of one plantation from 40 to 5 tons of beans. The coccid, *Ferrisia virgata*, was found to be invariably present on the galls, but never on healthy flower cushions. Since repeated applications of insecticides which killed the mealy bugs also brought about the disappearance of the galls, *F. virgata* is thought to be the cause. Very effective control of the galls is obtained by spraying the trees 3 times with 3% BHC at 8-day intervals; if necessary, the treatment should be continued at 20-day intervals. Three species of wasp were found to parasitize *F. virgata*.

7029. Thresh, J. M.
Some isolates of virus causing swollen-shoot disease of cacao in Nigeria and their interrelationships.
Ann. appl. Biol., 1961, **49**: 340-6, bibl. 15, illus.

Many symptomatically distinct virus isolates were made from infected cacao trees in 6 different localities. Two isolates caused swellings as the only permanent symptom and another caused only leaf chlorosis. The others caused both swellings and chloroses of different type and severity. Two atypical isolates were much less virulent than the others and caused only transient and very inconspicuous leaf symptoms. Isolates from the same or from adjacent trees usually protected against each other, whereas those from dissimilar areas did not. This suggests that the isolates are not all closely related and that they may be grouped according to the results of plant protection tests. [From author's summary. See also *H.A.*, 31: 1399.]—W.A.C.R.I., Ibadan.

7030. Desrosiers, R.
Últimos avances en el control de enfermedades del cacao en el campo. **(Recent advances in the control of cacao diseases in the field.)** [English summary ½ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 99-103, bibl. 8.

Phytophthora palmivora, Ceratostomella fimbriata, Monilia sp.

7031. Befeler F., P. E.
Investigación sobre el uso de adherentes en fungicidas en el control de *Phytophthora palmivora* Butl. **(Investigation on the use of stickers in fungicides for the control of *Phytophthora palmivora*.)** [English summary ½ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 118-29, bibl. 12.

Thirteen fungicides and 13 stickers were tested to find the best combination for use on cacao seedbeds in Costa Rica. After 2 preliminary experiments the best 5 fungicides and the best 4 stickers were tested. The lowest infection rates 6 weeks after inoculation were given by Oleocuivre at 11·5 g. per gal. plus PEPS sticker at 5 c.c. per gal. (50·2%), Perenox at 10·3 g. per gal. plus PEPS (50·3), Perenox plus Vancide sticker at 5 c.c. per gal. (51·1) and Orthocide W-50 at 18·4 g. per gal. plus Vancide (51·7), but these were not better than the bordeaux mixture control (48·3%).—Serv. téc. interamer. Coop. agríc., C.R.

7032. Siller, L. R.
Aplicación de fungicidas a arboles de cacao en producción. **(Application of fungicides to bearing cacao trees.)** [English summary 14 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 192-200, bibl. 2.

Of 4 fungicides compared at high volume in field trials in Costa Rica during 1953/57 for the control of black pod (*Phytophthora palmivora*) bordeaux mixture gave the largest yield of pods and the smallest number of infected pods. Monthly application was more effective than application only at the time of major flushes. Applications to the whole tree, the trunk only and the foliage only were equally effective.—Inter-Amer. Inst. agric Sci., Turrialba.

7033. Lellis, W. T., and Peixoto, O., Jr.
Pulverização versus polvilhamento no controle da podridão parda dos frutos do cacaueiro. **(Spraying vs. dusting for the control of cacao black pod.)** [English summary 12 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 152-8, bibl. 5.

In a trial in Bahia, Brazil, the trees were inoculated with an aqueous suspension of the spores of *Phytophthora palmivora* shortly after treatment with Cobre Sandoz spray at 4,000 g. per 100 l. or Cobre Sandoz dust composed of 2,000 g. of the fungicide in 100,000 g. 1·5% BHC as diluent. Both treatments gave good control, the percentage of diseased pods being 14·6 and 18·1, respectively, compared with 52·2 in the control. A Roto-Farmer duster was more economical than the sprayers.—Inst. Cacau, Bahia.

7034. da Cruz, H. M.
Resultados de tres anos de controle da podridão parda e pragas do cacaueiro na Bahia. **(Results of three years' trials for the control of black pod and pests of cacao in Bahia.)** [English summary ½ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 165-82, bibl. 7, illus.

In experiments during 1955-57 4-6 sprays of copper fungicide (0·5% copper oxychloride or 0·3% Cobre Sandoz) were applied between mid-February and mid-August for the control of black pod (*Phytophthora palmivora*). The treatments gave good control and resulted in an average increase of 10·3 healthy pods or 370 g. dry cacao per tree. Four sprays appeared to be sufficient. Simultaneous control of ants was successfully carried out, using 30 g. 3% BHC dust per colony of *Azteca paraensis* var. *bondari*, and methyl bromide against *Atta* spp.—Minist. Agric., Brazil.

7035. Ocana, G., and Hansen, A. J.
Preliminary studies on the use of agricultural spray oil for the protection of cacao against *Phytophthora palmivora*. [Spanish summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 196-9.

Although spray oil did not control *Phytophthora palmivora* on cacao, it delayed infection by the fungus and augmented the effectiveness of copper fungicides.—Inter-Amer. Inst. agric. Sci., Turrialba, C.R.

7036. Delgado, J. C., Ampuero P., E., and Doak, K. D.
Posible evidencia de resistencia a la *Monilia roreri*, Cif. y Par. en algunos clones de la Estación Experimental Tropical de Pichilingüe. **(Possible evidence of resistance to *Monilia roreri* in some clones at the Pichilingüe Tropical Experimental Station [Ecuador].)** [English summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 184-92, bibl. 8.

The wide differences in resistance to monilia pod rot among 52 clones under observation for 3 years showed no relationship to the geographical origin or the type category of the clones. Those most promising under local conditions are indicated.

7037. Desrosiers, R.
El problema de la *Ceratostomella* en el Ecuador. **(The problem of *Ceratostomella* in Ecuador.)** [English summary ⅓ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 67-72, bibl. 7, illus.

Notes on symptoms and susceptibility (criollo types and ICS-1 are susceptible) are followed by advice on control as follows: (1) limit plantings of susceptible types, (2) remove and burn infected trees and branches, (3) sterilize pruning tools with formaldehyde, (4) avoid unnecessary injury to trees. The planting of the resistant trinitario and forastero types is recommended.—Serv. téc. interamer. Coop Agric., C.R.

7038. Malaguti, G.
Observaciones sobre la enfermedad necrosis del tronco de cacao por *Ceratostomella fimbriata* en Venezuela. **(Observations on cacao stem rot caused by *Ceratostomella fimbriata* in Venezuela.)** [English summary 9 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 80-5, bibl. 5.

Inoculation tests showed criollo types to be the most susceptible. Phygon XL was very toxic to the fungus in culture tests, but fungicides are generally not effective.—Cent. Invest. agron., Maracay.

7039. Bartley, B. G. D.
Observations on the reaction of young cacao seedlings to artificial inoculation by *Marasmius perniciosus* Stahel. [Spanish summary 1 p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 104-17, bibl. 3.

Further studies have shown that Holliday's seedling inoculation test [see *H.A.*, 26: 1121] is not sufficiently sensitive to give a result comparable to that obtained with natural infection, and produces inconsistent results if environmental conditions vary. The test is, however, useful under certain conditions.—Imp. Coll. trop. Agric., Trinidad.

7040. Rubio, F., Desrosiers, R., and Bullard, E. T.
Variaciones en rendimiento, valor de mazorca e incidencia de "escobas de bruja" (*Marasmius perniciosus*, Stahel) en progenies híbridas. **(Variations in yield, pod value and incidence of witches' broom in hybrid progenies.)** [English summary 7 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 534-8, bibl. 3.

Of 4 hybrids tested at Pichilingüe, Ecuador, one —EET 6 × SCA 6—gave higher yields than the parent clones. Five years after planting some of the hybrid trees had not yet developed any brooms.

7041. Ampuero [P.], E., and Desrosiers, R.
Comportamiento en resistencia a la escoba de bruja de los clones Silecia-l y 5 traidos del oriente ecuatoriano. **(Resistance to witches' broom in clones Silecia-l and 5 brought from eastern Ecuador.)** [English summary ½ p.]
Ampuero [P.], E.
Progresso alcanzados en el Ecuador en el estudio de selección para resistencia a la escoba de bruja. **(Progress made in Ecuador in the study of selection for resistance to witches' broom.)** [English summary ⅓ p.]
Ampuero [P.], E., and Alvarado, R.
Variación en resistencia a la escoba de bruja, rendimiento e índice de mazorca en la progenie híbrida interclonal. **(Variation in resistance to witches' broom, yield, and pod index in inter-clonal hybrid progenies.)** [English summary ⅓ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 156-65, bibl. 10, illus; pp. 166-73, bibl. 5; and pp. 174-83, bibl. 8.

These 3 papers give accounts of cacao breeding and selection carried out at the Tropical Experimental Station, Pichilingüe, Ecuador, in an attempt to check the spread and reduce the incidence of witches' broom (*Marasmius perniciosus*). Two very promising clones, Silecia-l and Silecia-5, were developed from material obtained in the Río Napo area and crossed with high-yielding clones. Data on the resulting progenies appear in the first paper. The second paper gives similar preliminary data covering selected clones and inter-clonal hybrids resulting from the selection work begun in 1949, and the third analyses the results of hybridizations carried out since 1951. In general, high yield remained associated with low disease resistance, and low yield with high resistance, but the 6 most promising hybrids are being further investigated.

7042. Ramos, C. H.
Enfermedades del cacao. La escoba de brujas. **(Cacao diseases. Witches' broom.)**
Agric. venezol., 1960, **24**(221): 27.

In Venezuela witches' broom (*Marasmius perniciosus*) is controlled in large plantations by monthly spraying with bordeaux mixture. Where this is uneconomic, surgical measures are applied at pruning time, and the diseased material is burned. Resistant varieties are being bred and selected.

7043. Shenefelt, R D., Stelzer, M. J., and Lara E., F.
Results from preliminary studies of some aspects of the relationship of insects to cacao production in Costa Rica. A second progress report. [Spanish summary ¼ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 236-47, illus.

A relationship has been found in Costa Rica between the wilt of young pods and certain tree hoppers, leafhoppers and an aphis feeding on the pedicels of young fruits. Dieldrin did not lower fruit set but appeared to reduce cherelle wilt. Evidence for an increase of bean weight per pod following the use of insecticides was obtained. The relationship between pests and cushion gall were also studied.

7044. Moncayo M., E. R.
Plagas del cacao en los departamentos de Santander y Antioquia, Colombia. **(Cacao pests in the Santander and Antioquia departments of Colombia.)** [English summary 5 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 261-9, bibl. 3, illus.

A list is given of 31 pests of flower, fruit, leaf, stem and branch. Of the four most important pests no means of controlling *Xyleborus* is known other than the destruction of infested trees; *Monalonium dissimulatum* and geometrid larvae attacking the pods can be controlled with lindane sprays; aegeriid trunk-boring larvae can be controlled by washing the trunk with 10 g. 80% lindane in 20 l. water.—Campaña Cacao, STACA, Colombia.

7045. Belin, M.
Le problème des capsides au Ghana. **(The problem of capsids in Ghana.)**
Café, Cacao, Thé, 1961, **5**: 38-43.

With notes on the use of lindane.

7046. Hernández S., A., Palma, M., and Ron Pedrique, A.
Presencia de la "chinche", "mosquilla" o "chupanca do cacau" (*Monalonium dissimulatum* Dist.) en Venezuela y su control. **(*Monalonium dissimulatum* and its control in Venezuela.)** [English summary 12 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 254-60, bibl. 6.

Notes are given on morphology, distribution, alternative hosts (*Begonia*, *Cecropia* and *Crotalaria* spp.) and pod injuries. Control recommendations include: (1) picking the pods at the end of the dry season, (2) light pruning to facilitate the passage of a sprayer, (3) spraying with Mortegg at 2% (which has only a short residual effect), 40% diazinon at 1%, 75% DDT at 0·5% or Rocío Blanco Shell at 1%. Both adults and nymphs are highly susceptible and spraying gave yield increases of nearly 100%.—Minist. Agric., Caracas.

7047. Entwhistle, P. F.
A review of the problems of shot-hole borer (Coleoptera, Scolytidae and Platypodidae) attack in cocoa in West Africa. [Spanish summary ¾ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 208-23, bibl. 31.

Of the 27 species from these 2 families recorded on cacao in West Africa *Xyleborus morstatti* is the principal pest throughout the area. The life history of the beetle is outlined, and unsuccessful experiments on its control with insecticides and cultural practices are reported.—W. Afr. Cocoa Res. Inst., Ibadan.

7048. Idrobo M., S.
El complejo *Xyleborus-Ceratostomella* en Colombia. (**The *Xyleborus-Ceratostomella* complex in Colombia.**) [English summary ⅓ p.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?], pp. 73-9, bibl. 17.

The subjects discussed in this review include factors predisposing trees to *Ceratostomella* attack (insect and *Phytophthora faberi* attack), and control of *Xyleborus* by treating wounds with Verindal, aldrin or dieldrin at 0·25% or toxaphene or DDT at 1%.—Campaña nac. Cacao, Valle.

7049. Wallenius, K. E.
Observaciones sobre *Xyleborus* y el combate del mismo en el cacao. (**Observations on *Xyleborus* on cacao and its control.**) [English summary 9 lines.]
Sépt. Conf. interamer. Cacao, Palmira, 1958, [1960?] pp. 270-3.

In experiments in Ecuador applying 40% toxaphene or 40% aldrin from the air at 3 kg. per 6 gal. water per ha. when the *Xyleborus* insects were emerging from their galleries gave some control. The application of 2·5 kg. Caocobre copper fungicide per ha. in 4 gal. water when sprayed from the air or in 25 gal. with a mist-blower increased yields, eliminated moss and lichens and reduced infection by *Colletotrichum gloeosporioides*, *Marasmius perniciosus* and *Monilia roreri*.—Hacienda Clementina, Ecuador.

Cacao—fermentation and by-products.

7050. Griffiths, L. A.
The significance of current research on cacao fermentation. [Spanish summary ½ p.]
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 56-64, bibl. 10.

Astringency is now believed to be due to l-epicatechin, not to the purple anthocyanin pigments as formerly supposed. Chromatographic studies have failed to confirm Quesnel's hypothesis [*H.A.*, 28: 3058] that the chocolate flavour principle is a phenolic glycoside. Small-scale fermentation techniques have led to a more complete understanding of the changes occurring during fermentation. The essence of the process is the establishment of an optimal acetic acid/temperature relationship resulting in cell lysis and the liberation of enzymes and flavour substrates. Departure from the optimal relationship results in high astringency and lack of chocolate flavour, and the reasons for this are discussed. The author's experiments support the view that the earlier stages of fermentation are anaerobic. The changes in the bean fall into three phases: the anaerobic lytic phase and the anaerobic enzymic phase during fermentation, followed by an aerobic enzymic phase during drying. [From author's summary.]—I.C.T.A., Trinidad.

7051. Purr, A., Springer, R., and Morcinek, H.
The enzymatic transformations within cacao beans during the fermentation process.
Proc. VIII inter-Amer. Cacao Conf., Trin. Tob., 1960, [1961], pp. 65-7, bibl. 8.

Coupled reactions between protein components and primary oxidation products formed from catechol by polyphenoloxidase are discussed.—Inst. Lebensmitteltech. Verpack., Munich.

7052. Dittmar, H. F. K.
Sôbre cascas de frutos de cacau da Bahia. (**Cacao pod rinds of Bahia.**) [English summary 3 lines.]
Sépt. Conf. Interamer. Cacao, Palmira, 1958, [1960?], pp. 409-13, bibl. 6.

Details are given of the mineral composition (0·91–1·55% total N, 0·30–0·49% P_2O_5, 2·85–5·27% K_2O, 0·40–0·60% MgO) and other inorganic and organic compounds (including theobromine, lipid substances, crude proteins, glucose, sucrose and pectins) of the pod rinds of 5 forastero varieties. The material could be used as a fertilizer.—Inst. Tecnol. Bahia, Salvador, Brazil.

Cashews.

(*See also* 7280, 7289.)

7053. Morton, J. F.
The cashew's brighter future.
Econ. Bot., 1961, **15**: 57-78, bibl. 154, illus.

A review covering the morphology, origin, distribution, propagation, culture, varieties, pests and diseases, yield, harvesting, processing, food value and uses of the cashew tree and its products.

7054. Wheatley, P. E.
The insect pests of agriculture in the Coast Province of Kenya. II—Cashew.
E. Afr. agric. For. J., 1961, **26**: 178-81.

The characteristics, life history, damage caused by, and control of, *Helopeltis anacardii*, the cashew nut weevil (*Mecocorynus loripes*), the cashew nut stem girdler (*Paranaleptes reticulata*), the scale insect *Pseudoaonidia trilobitiformis* and several minor pests.—Dep. Agric., Kenya.

Coconuts.

(*See also* 7280.)

7055. Pankajakshan, A. S., and George, M.
Character association studies in coconut seedlings.
Indian Coconut J., 1961, **14**: 67-70, bibl. 4.

In over 14,000 seedlings height and number of leaves were found to be practically independent, but the girth of the seedling at the collar was positively correlated with both height and leaf number, these 2 relationships accounting for over 60% of the variation in girth.—Cent. Coconut Res. Stat., Kasaragod.

7056. Marar, M. M. K., and Shambhu, K.
Coconut nursery studies. III. Vigour of seedlings in relation to the floating position of seednuts in water.
Indian Coconut J., 1961, **14**: 45-8, bibl. 3, illus.

The vigour of seedlings was found to be greatest when the seednut floated vertically in water and least when it floated horizontally. [For earlier work see *H.A.*, 31: 1411.]—Cent. Coconut Res. Stat., Kasaragod.

7057. Ziller, R., and Frémond, Y.
Nouveaux résultats sur la fumure du cocotier en Côte d'Ivoire. **(New results with coconut fertilization in the Ivory Coast.)**
Oléagineux, 1961, **16**: 293-300, bibl. 6, illus.

In two trials on bearing palms begun in 1952 and 1955 at Port Bouet 1·5 kg. of KCl per palm per annum increased the number of nuts by 62% and the amount of copra per nut by 23%, and raised the copra yield from 1·1 to 2·1 tons per ha. The net increase in revenue was 30,000 francs (C.F.A.) per ha. In 2 trials on young palms only K had a favourable effect on both growth and earliness of bearing; the application of K, possibly accompanied by P, is considered essential. Palms can be brought into bearing considerably earlier by the application of organic manure in the planting hole combined with annual applications of 0·2, 0·35, 0·5, 0·7 and 0·8 kg. KCl per palm during the first 5 years. Graphs and tables show the effects of K and other nutrients on the leaf content of N, Ca, Mg, Na and P.

7058. Gangolly, S. R., and others.
Studies on the pollen in the coconut (*Cocos nucifera* Lin.). 1. Its importance, output in different varieties and composition in the still air.
Indian Coconut J., **14**: 49-66, bibl. 35, illus.

The output of pollen and details of male flower production were studied throughout the year in 3 tall varieties, 3 dwarf varieties and 3 hybrids. Inappreciable differences were found in the amounts of pollen per flower and the number of flowers per inflorescence. There were, however, significant differences in the number of male flowers between varieties, Dwarf Orange having the highest and Dwarf Green the lowest. Pollen production also varied considerably according to the season, there being a considerably greater output during the dry season than during the monsoon. Pollen catches indicated a greater percentage of coconut pollen in the air at 15–20 feet than lower down and in March and April than in other months.—Cent. Coconut Res. Stat., Kasaragod.

7059. Castillo, B. S.
A new approach to the coconut cadang-cadang disease problem.
Coffee Cacao J., 1961, **3**: 295, 318, illus, from *Trop. Abstr.*, 1961, **16**, Abstr. i 1461.

The author attributes the initial symptoms (chlorotic or brown spots on the leaf pinnae) to the feeding of mealybugs and perhaps other insects. Afterwards, dead as well as green parts of the tree are attacked by *Marasmius* sp., which causes defoliation and inhibits the development of inflorescences.

7060. Antony, J., and Kurian, C.
A note on the bacterial disease of *Nephantis serinopa* Meyrick, a lepidopterous pest of the coconut palm.
Indian Coconut J., 1961, **14**: 82-4.

In trials a larval mortality of 70% in 72 hours was observed in *N. serinopa* after spraying a suspension of the bacterium *Serratia marcescens*.—Cent. Coconut Res. Stat., Kayangulam.

7061. Coconut Research Institute of Ceylon.
Red weevil and its control.
Leafl. Coconut Res. Inst. Ceylon 37, [1960], pp. 15, illus.

Rhynchophorus ferrugineus is described and its life-history illustrated. Systox is recommended for control. This should be applied by chiselling a hole 2 in. deep in the trunk above the infested area, fixing a funnel in the hole and filling the funnel with water containing ¼ fl. oz. of Systox. After 4 days the funnel can be removed and the hole plugged.

7062. Rajasekharan, N., Bhatia, D. S., and Pandalai, K. M.
Some preliminary studies on mechanical drying of coconuts.
Indian Coconut J., 1961, **14**: 71-81, bibl. 7.

It was shown that through-flow driers were more effective for drying coconuts in cup form (i.e. nuts husked and halved) than cross-flow driers; that good white copra could be obtained with an air temperature of 60° C., above which discoloration was likely; and that an initial temperature of 70° C. for 8 hours followed by 60° C. reduced the drying time appreciably without lowering quality.—Cent. Coconut Res. Stat., Kasaragod.

7063. Tulecke, W., and others.
The biochemical composition of coconut water (coconut milk) as related to its use in plant tissue culture.
Contr. Boyce Thompson Inst., 1961, **21**: 115-28, bibl. 53.

Young and green nuts were examined. Malic was the predominant organic acid; shikimic and quinic and two unidentified acids were present in all samples. Alanine and γ-aminobutyric and glutamic acids constituted about 75% of the free amino acids of the fluid from mature fresh coconuts; glutamine, arginine, asparagine, alanine and aspartic acid made up about 70% in young green coconuts. The sugar content increased from 0·9 g./100 ml. in young fruits to 2·2 g./100 ml. in mature green coconuts. The ribonucleic acid phosphorus content of fruits of different ages was fairly constant; the deoxyribonucleic acid increased with the age of the fruits. [From authors' summary.]

Coffee—general.

(*See also* 7243.)

7064. Martínez, A., and James, C. N.
Café: bibliografía de las publicaciones que se encuentran en la Biblioteca del Instituto. **(Coffee: bibliography of publications in the [Inter-American] Institute library.)**
List. bibl. Inst. inter-amer. Cien. agríc., Turrialba, **1**, revised 1960, pp. 637, $3.00.

The first edition of this bibliography of coffee publications to be found in the Orton Memorial Library at Turrialba, Costa Rica, was published in 1953 [see *H.A.*, 24: 1978]. Since then the literature on coffee has grown enormously, and the present volume contains some 5,227 references compared with 1,840 in the first edition. The classification has been revised to cope with this increase, and the papers are now classified under 15 main and 74 sub-headings instead of the original 6 and 33. These 15 main headings are: coffee bibliographies, history and origin, general works, the coffee tree, climate, soils, cultivation practices, weed control, diseases and pests, technology and processing, uses and by-products, research, farm management, extension work, conferences and courses, and the author index. The more important main headings are well subdivided. This extensive compilation is not only of direct value to workers in all fields connected with coffee, but it also provides a key to the Institutes' service of providing photocopies and microfilms. These are available for any of the papers listed in the bibliography.

7065. Suárez de Castro, F.
Sistemas de siembra y de cultivo del café en América. **(Methods of planting and growing coffee in [Latin] America.)**
Agric. trop., Bogotá, 1961, **17**: 137-51, bibl. 32, illus.

In Brazil coffee seed is sown direct, the plants are raised in groups of 4–6 without shade, and after mass harvesting the fruits are dried with the pulp intact. In most other parts of Latin America seedbeds and nurseries are used, shade trees are planted, and the selected ripe fruits are depulped before being fermented and dried. Details and local variations are described. The Hawaiian system is characterized by the absence of shading, copious manuring and heavy pruning, and the Guatemalan system by planting in double or triple hedges. The results of recent research on varieties, shading, spacing, manuring, soil conservation and management are briefly reviewed.

7066. Wellman, F. L.
Recomendaciones para mejorar el cultivo del café en Puerto Rico. **(Recommendations for improving the growing of coffee in Puerto Rico.)** [English summary 6½ pp.]
Bol. P.R. Estac. exp. agríc. **153**, 1960, pp. 113, bibl. 82, illus.

Soils, varieties, seed-beds, nurseries, planting, manuring, pruning, shading, control of weeds, pests and diseases, and harvesting.

7067. FAO.
Report of the first FAO technical meeting on coffee production and protection.
FAO Mtg Rep. **PL 1961/3**, 1961, pp. 37.

The meeting was held at Abidjan in the Ivory Coast in 1960, and this report records discussions on coffee genetical improvement, nutrition, water and shade requirements, diseases and pests, processing, research and future technical projects.

7068. Lyamungu.
Research Report of the Coffee Research Station, Lyamungu, Tanganyika for 1960, 1961, pp. 68, 10s.

No further Annual Reports will be issued from Lyamungu. In their place comes this Research Report, which comprises a number of separate papers on the research in progress. These appear as separate abstracts below.

7069. U.S. Dep. Agric., Foreign Agricultural Service.
World coffee crop down.
Foreign Agric. Circ. U.S. Dep. Agric. **FCOF 1-61**, 1961, pp. 11.

1960–61 crop now estimated at 64·9 m. bags, 13·5 m. less than 1959–60.

7070. Dublin, P.
Quelques données sur la productivité du caféier excelsa en République Centrafricaine. **(Some data on the productivity of excelsa coffee in the Central African Republic.)**
Café, Cacao, Thé, 1961, **5**: 11-27, bibl. 36, illus.

Production figures for trees in several areas and the factors affecting them are discussed.

Coffee—breeding, selection and culture.

(*See also* 7261, 7270, 7289, 7292.)

7071. Narasimhaswamy, R. L., and Vishveshwara, S.
Report on hybrids between some diploid species of *Coffea* L.
Indian Coffee, 1961, **25**: 104-9, bibl. 10, illus.

Crosses using *Coffea canephora*, *C. excelsa* and *C. liberica* as female parents and *C. liberica* and *C. eugenioides* as male parents are described, and their value in breeding for rust resistance is discussed.

7072. Fernie. L. M.
The selection of arabica coffee at Lyamungu. I. The "N" series.
Res. Rep. Lyamungu Coffee Res. Stat. 1960, 1961, pp. 12-17, bibl. 3, illus.

The final selections are all bronze-tipped types with high yields, the outstanding one being N 39. All the "N" series are known to be susceptible to the important rust races endemic in the region. Yield data are given.

7073. Carvalho, A.
Proteção das mudas de café. **(Protecting coffee transplants.)**
Bol. Super. Serv. Café, S. Paulo, 1960, **35**(405): 7-8.

Against drought, frost and weeds with mulches, etc.

7074. Warden, J. C.
The action and value of organic mulches on the yield and nutrition of the coffee tree.
Res. Rep. Lyamungu Coffee Res. Stat. 1960, 1961, pp. 25-33, bibl. 7.

All 3 mulches used, viz. banana trash, guinea grass and elephant grass, increased the yields of arabica coffee, the increase being greater in unshaded than in lightly shaded plots. These mulches, particularly the banana trash, improved the physical structure and fertility of the soil and caused an increase in K uptake by the coffee trees. Mulching in the rows or inter-rows is recommended as a pre-rains treatment, followed by a complete soil cover at the end of the rainy season.

7075. Mendoza, S. P., and Tuazon, A. B.
The effect of different mulching materials on the growth and yield of arabica coffee.
Coffee Cacao J., 1961, **3**: 275, 284, 292, bibl. 6, from *Trop. Abstr.*, 1961, **16**, Abstr. i 443.

In a mulching experiment with 2-year-old trees in the Philippines the yield of fresh cherries in the control plots was 622 g. per tree. In the plots mulched with coconut, *Imperata cylindrica* and banana leaves the yields were 1,018, 1,032 and 1,802 g. per tree, respectively. A soil covering of black plastic sheets did not appreciably increase the yield, and the trees showed early yellowing of the leaves and branch die-back. The plastic cover moreover was pierced by *Imperata* grass.

7076. Suárez de Castro, F.
Distribución de la raíces del cafeto (*Coffea arabica* L.) en un suelo de El Salvador. **(Distribution of coffee tree roots in a Salvador soil.)**
Café El Salvador, 1960, **30**: 421-9, bibl. 10, illus., from *Trop. Abstr.*, 1961, **16**, Abstr. i 601.

Groups of 2-, 7–8 and 12–15-year-old trees were examined in the field; 1-year-old plants were examined in a nursery. The soil was a loamy sand with hardpan layers at depths of 40–44 and 62–72 cm. The length of the tap root of the nursery plants was only 20 cm., and nearly all the roots of these plants were concentrated in the top layer of 30 cm. The tap root of adult trees reached a depth of 50 cm. The percentage of feeding roots in the top layer of 30 cm. first decreased with age, then increased again. The horizontal diameter of the root system of 2-year-old trees was 80 cm., and of adult trees 130 cm.

7077. Mendes, J. E. T.
Vários aspectos do problema da poda do cafeeiro. **(Various aspects of the problem of pruning coffee.)**
Bol. Super. Serv. Café, S. Paulo, 1960, **35**(405): 5-6, and (406): 5-8.

Coffee pruning systems in use in Colombia, Costa Rica, Kenya, Tanganyika, Guatemala, Mexico and Hawaii are outlined. Since the comparatively recent introduction of the vigorous Mundo Novo type of coffee on a large scale in parts of Brazil, the group-planting system, which made pruning unnecessary or even harmful, is being replaced by single planting in hedges.

7078. Fernie, L. M.
A comparison of the multiple and single stem pruning systems under conditions of light shade.
Res. Rep. Lyamungu Coffee Res, Stat. 1960, 1961, pp. 18-24.

The yields of trees pruned to a single stem were very low for the first 7 years of bearing, and did not exceed 10 cwt./acre until the 10th year. Yields from multiple-stem trees were good from the 3rd to the 6th years of bearing, and, although they were outyielded by the single-stem trees between the 10th and 22nd years, this initial advantage resulted in a higher average yield over the whole 22 years.

7079. Warden, J. C.
Experiments and observations on the contribution of a dry topsoil to mineral deficiencies in the coffee tree. A. Studies by foliar analysis.
Res. Rep. Lyamungu Coffee Res. Stat. 1960, 1961, pp. 34-42, bibl. 21.

The N, P, S, K, Ca and Mg contents of coffee leaves at various periods were determined, and the soil moisture at depths of 6, 12, 24 and 36 inches measured with calibrated gypsum blocks. The soil was found to dry out to a point near or exceeding the wilting point in the hot dry weather, at which time pronounced deficiencies of P and K were found in the leaves.

7080. Medcalf, J. C., Bontempo, A., and Favre, G.
The use of pre-emerge herbicides for weed control in young coffee.
Bull. I.B.E.C. Res. Inst. **25**, 1961, pp. 39, bibl. 39, illus.

Simazine and diuron were tested at $\frac{1}{2}$, 1, 2 and 4 kg./ha. in a coffee plantation in São Paulo. Although the $\frac{1}{2}$-kg. level of both was not entirely satisfactory, all rates significantly reduced weed growth, and, except between the 2 and 4 kg. levels, the degree of control between the levels differed significantly. In all cases diuron gave lower weed counts and showed greater persistence. Over 17 months excellent control was obtained with 2 applications of diuron, and slightly less effective control by 3 of simazine. Chemical control proved much cheaper than hand weeding.

7081. Sein, F.
Ayudan las abejas al cafetalero? **(Are bees useful to the coffee grower?)**
Hacienda, 1959, **55**(4): 36-50, from *Supl. bibl. Turrialba*, 1960, **10**, Abstr. 71/60.

Experiments in Puerto Rico showed that fruit set reached 60% in coffee trees caged to exclude bees, and 70% in both those uncaged and those caged but visited by bees. Various other insects, including certain flies and ants, were present in the cages. The caged trees, however, produced fewer flowers than those exposed.

Coffee—diseases and pests.

(*See also* 7072, 7261, 7270.)

7082. Foucart, G.
"Shedding" et "coffee berry disease" du caféier d'Arabie. **(Shedding and coffee berry disease of arabica coffee.)**
Parasitica, 1961, **17**: 22-8.

There is evidence that the shedding of coffee berries 4–5 months before maturity is not a direct consequence of attacks by *Colletotrichum coffeanum*, although ecological factors may result in the fungal attacks and loss of berries occurring simultaneously. In some localities resistance to berry disease may be associated with a low propensity for shedding; however, a variety with both these characteristics in one area may prove susceptible to berry disease in another area. Preliminary control trials with growth substances which temporarily increase photosynthesis indicate a likelihood of success on a practical scale.—Inst. nat. Ét. agron. Congo, Bruxelles.

7083. Meiffren, M.
Contribution aux recherches sur la trachéomycose du caféier en Côte d'Ivoire. **(A contribution to the investigations on tracheomycosis of coffee in the Ivory Coast.)**
Café, Cacao, Thé, 1961, **5**: 28-37.

Curative measures being ineffective, control is carried out by eliminating the trees attacked by *Fusarium xylarioides*. Resistant clones are being selected, particularly from Kouilou and Indénié types, because the resistant INÉAC variety of robusta is not suited to some Ivory Coast areas. There is evidence that one factor concerned in resistance is a high content of chlorogenic acid in the wood of the stem.

7084. Burdekin, D. A.
Survey of races of coffee leaf rust in Northern Tanganyika.
Res. Rep. Lyamungu Coffee Res. Stat. 1960, 1961, pp. 60-1, bibl. 3.

Races I and II are widespread, Race III (unconfirmed) is present at Lyamungu.

7085. Burdekin, D. A.
The effect of captan and copper sprays on leaf rust and leaf fall of coffee.
Res. Rep. Lyamungu Coffee Res. Stat. 1960, 1961, pp. 56-9.

Good control of *Hemileia vastatrix* and leaf retention were obtained by 4 applications of $4\frac{1}{2}$ lb. captan in 160 gal. per acre in February and March. The control was superior to that obtained with copper fungicides.

7086. Schieber, E., and Nery Sosa, O.
Nematodes on coffee in Guatemala.
Plant Dis. Reptr, 1960, **44**: 722-3, bibl. 3, illus.
Identificación de nemátodos que atacan al cafeto en Guatemala. **(Identification of nematode pests of coffee in Guatemala.)** [English summary 7 lines.]
Invest. agropec., Guatemala, 1960, **1**: 100-4, bibl. 6, illus.

Meloidogyne exigua and *Pratylenchus coffeae* are common in Guatemalan coffee plantations, particularly on the bourbon and pache varieties of arabica, but robusta appears to possess relatively high resistance to them.

7087. Chitwood, B. G., and Berger, C. A.
Preliminary report on nemic parasites of coffee in Guatemala, with suggested *ad interim* control measures.
Plant Dis. Reptr, 1960, **44**: 841-7, bibl. 39, illus.

Meloidogyne exigua, *M. incognita* and *Pratylenchus coffeae* are recorded as severe parasites affecting both arabica and robusta. Sugar cane and native field corn should not be grown immediately before coffee. The use of *Festuca elatior* as a ground cover, *Tripsacum guatemalensis* as a green manure, *Crotalaria* spp. as a green manure and for early shade and the planting of *Tagetes* spp. and *Asparagus officinalis* are suggested, as all these species reduce nematode populations.—Kaiser Found. Res. Inst., Richmond, Calif., and Asoc. exp. Cafet., Guatemala.

7088. Crowe, T. J., Jones, G. D. G., and Williamson, R.
The use of pyrethrum formulations to control *Antestiopsis* on coffee in East Africa.
Bull. ent. Res., 1961, **52**: 31-41, bibl. 12.

The history of the use of pyrethrum formulations to control *Antestiopsis* spp. on arabica coffee in Kenya is reviewed. The material with which the present work was done comprised three distinct forms of *Antestiopsis* of doubtful taxonomic status; these were not observed to differ in their response to the insecticidal treatments used. Laboratory experiments showed that *Antestiopsis* was highly susceptible to pyrethrum and that the addition of piperonyl butoxide, a pyrethrum synergist, did not affect this response. Preliminary field experiments showed that concentrations of pyrethrins higher than those found effective in the laboratory were required. These observations and experiments suggested a two-phase method of control, using pyrethrum as a non-persistent foliage spray at an economical but effective concentration of 0·005–0·006% pyrethrins, coupled with a 5% DDT or 0·5% dieldrin dust applied to the bole of the tree to form a persistent toxic barrier. The spray removed the bugs from the tree, whilst the dust prevented the return of, or killed, those that had only received a sub-lethal dose of pyrethrum. This two-phase treatment has been used successfully both in trials and in commercial practices for the control of *Antestiopsis*. When the initial population is in excess of 20 per tree, two spray applications and one dusting are necessary to effect control. [From authors' summary.]—Coffee Res. Stat. and Pyrethrum Bd. Res. Labs, Kenya.

7089. Puzzi, D., Orlando, A., and Otero M., G.
Ensaios de laboratório para o contrôle da cochonilha verde no café—*Coccus viridis* (Green)—com emprêgo de diversos inseticidas. **(Laboratory trials for the control of coffee green scale with different insecticides.)** [English summary ½ p.]
Arq. Inst. biol. S. Paulo, 1959, **26**: 197-202, bibl. 3.

Of 10 insecticides compared the best control was given by 0·15% malathion emulsifiable concentrate plus 1% miscible oil (89% mortality), 0·03% EPN emulsifiable concentrate plus 1% oil (82%) and 0·15% malathion alone (77%). The addition of 1% miscible oil to the malathion and EPN significantly increased mortality.

7090. Tapley, R. G.
Coffee leaf-miner epidemics in relation to the use of persistent insecticides.
Res. Rep. Lyamungu Coffee Res. Stat. 1960, 1961, pp. 43-55, bibl. 6.

A re-examination of the complex of leaf miners and their parasites, undertaken on account of the recent increase in the severity of leaf-miner epidemics, has shown that the pattern of outbreak remains the same, although *Leucoptera meyricki*, previously of minor importance, has replaced *L. caffeina* as the dominant pest. Of the parasites the previously prevalent *Apanteles bordagei*, *Zagrammosoma variegatum* and *Parahormius leucopterae* have become of less importance, *Pleurotropis coffeicola* has retained its position, and the dominant role is played by *Ageniaspis* sp. Dieldrin and DDT sprays prolonged and intensified the epidemics but increased the ratio of *Ageniaspis* sp. to other parasites.

7091. Mariconi, F. A. M., and Castro, U. P.
Nova lagarta depredadora do cafeeiro e seu contrôle com inseticidas. **(A new caterpillar pest of coffee and its control by insecticides.)** [English summary 8 lines.]
Biológico, 1961, **27**: 37-9, bibl. 3, illus.

A species of *Podalia* recently reported on coffee in São Paulo, Brazil, was successfully controlled by spraying with 0·3% Dipterex. Six other insecticides failed to give control.

7092. do Amaral, S. F., Puzzi, D., and Orlando, A.
Polvilhamento do solo como método de combate à broca do café. **(Soil dusting for the control of the coffee berry borer.)** [English summary 14 lines.]
Arq. Inst. biol. S. Paulo, 1959, **26**: 33-40, bibl. 4, illus.

Dusting the trees with 1% BHC in early January gave better control of *Stephanoderes hampei* (0·6% incidence) than did soil dusting with 2·5% aldrin in November or December (14 and 16%) or with 2·0% BHC in November or December (7 and 9%). The degree of infestation in the control was 23%.

Coffee—harvesting and processing.

7093. Silva, S., Abruña, F., and Vicente-Chandler, J.
The effect of yields on picking efficiency in coffee production.
J. Agric. Univ. P.R., 1960, **44**: 173-5, bibl. 1, illus.

The efficiency of picking, as measured by pounds per hour, was found to increase with rising yields per acre, reaching a maximum around 1,800 lb. per acre, thereafter falling slightly.

7094. Aagaard, B. M.
Recirculation of water in a coffee factory.
Holme, R. V.
Conservation of water in coffee processing.
Kenya Coffee, 1961, **26**: 119-21, 125, illus., and 122-5, illus.

Both papers include designs for factories and details of procedure.

7095. Wooton, A. E.
Fermentation and onion flavour.
Kenya Coffee, 1961, **26**: 126-9, bibl. 6.

The production of propionic acid during fermentation may be prevented by reducing the fermenting time and by reducing or eliminating pre-washing. Sterilization cannot be recommended until the nature of the micro-organism responsible is better known.

7096. Menchu, J. F.
Ensayo de una máquina desmucilaginadora tipo Fukunaga. **(Tests with a Fukunaga machine for removing mucilage [from coffee].)**
Invest. agropec., Guatemala, 1960, **1**(1): 2-13, from *Supl. bibl. Turrialba*, 1960, **10**, Abstr. 68/60.

The machine has a 2 H.P. motor and depulps 40 lb. of cherry per min., leaving a little mucilage in the groove of the beans. This is removed by immediate drying or by a short period of fermentation.

7097. Eschenwald, A., and Hall, C. W.
Coefficient of friction, angle of repose, specific gravity, and bulk density of coffee fruits and coffee beans. [Spanish summary ½ p.]
J. Agric. Univ. P.R., 1961, **45**: 19-25, bibl. 9, illus.

On a tilting table pulped-washed-wet beans showed the highest coefficient of friction when compared with fruits, pulp, and pulped-unwashed or pulped-washed-dry beans. The dry beans showed the lowest. The specific gravity for green fruit varied from 1·0063 to 1·1163 and for ripe fruit from 1·0072 to 1·0884.

7098. Boyce, D. S.
The determination of moisture in parchment coffee and green coffee beans with a dielectric-type moisture-meter. [Spanish summary 1 p.]
J. Agric. Univ. P.R., 1960, **44**: 176-93, bibl. 19, illus.

The accuracy of the results obtained with a Kappa moisture meter, after calibration, were found to depend on the density of the sample and the temperature. The use of a 4-variable, addition-type alignment chart is recommended.

Mangoes.

(*See also* 5796.)

7099. Krochmal, A., and Salgado O., T. A.
Descriptions of mango fruits, I.
Ceiba, 1961, **9**: 21-36, illus.

Average weights of the whole fruit, fruit skin and seed, percentages of edible pulp, and dimensions of fruit are tabulated for 13 mango varieties, and natural-sized drawings are given of 12 of these and 2 additional varieties.—Panamer. agric. Coll., Zamorano, Honduras.

7100. Bose, A. N., and Das, K.
Studies on varietal suitability of fruits for preservation by canning: Part I—mangoes.
J. Sci. industr. Res., India, Sect. A, 1958, **17A**: 203-5, bibl. 4.

The variety Himsagar was the best of the 3 West Bengal varieties tested for canning. Langra was also satisfactory but stored for only 5 months; Fazli was unsatisfactory.—Jadavpur Univ., Calcutta.

7101. Young, T. W., and Miner, J. T.
Response of Kent mangos to nitrogen fertilization.
Proc. Fla St. hort. Soc., 1960, 1961, **73**: 334-6, bibl. 6.

Increasing the amount of N supplied to Kent mango trees growing on sandy soil in Florida by 9 or 10 times resulted in approximately a threefold increase in yield. Increasing N alone was as effective in increasing yield as when it was combined with increased P, K and Mg in comparable amounts. Either treatment caused a great increase in the incidence of soft-nose. [From authors' summary.]

7102. SINGH, S. N.
Sex-ratio of polyembryonic mango (*Mangifera indica* L.) varieties.
Sci and Cult., 1961, **27**: 103-4, bibl. 6.

There appears to be an inverse correlation between the yield of some polyembryonic mango varieties and the sex ratio of their flowers (staminate: hermaphrodite).—Hort. Res. Inst., Saharanpur.

7103. PUTTARUDRIAH, M., AND BASAVANNA, G. P. C.
Mango bunchy-top and the eriophyid mite.
Curr. Sci., 1961, **30**: 114-15, bibl. 5, illus.

Symptoms developed on healthy seedlings when eriophyid mites were introduced onto opening leaf-buds.

7104. KRISHNAMURTHY, G. V., JAIN, N. L., AND BHATIA, B. S.
Changes in the physico-chemical composition of mangoes during ripening after picking.
Food Sci., Mysore, 1960, **9**: 277-9, bibl. 12, from abstr. in *J. Sci. Food Agric.*, 1961, **12**: i-291.

Four varieties of hard green mangoes were picked, stored and analysed at 4 different stages of ripening. The total solids content of the pulp remained constant at all stages of maturity; the soluble solids, β-carotene and sugar contents and pH increased, whereas the water-insoluble solids and acid contents decreased rapidly with ripening.

7105. BASLAS, K. K.
Essential oil from the flowers of *Mangifera indica*.
Perfum. essent. Oil Rec., 1961, **52**: 156-8.

Steam distillation gave 0·04% of an oil, which contained, among other compounds, α-pinene, limonene, geraniol, nerol and 2 new sesquiterpene derivatives named mangiferol and mangiferone.—K.N. Govt Coll., Gyanpur.

Oil palms.

(*See also* 7126, 7130, 7261, 7280.)

7106. CHAPAS, L. C.
Plot size and reduction of variability in oil-palm experiments.
Emp. J. exp. Agric., 1961, **29**: 212-24, bibl. 5.

Two uniformity trials, conducted from 1944-55 and 1949-55, respectively, and the resulting computations are described. The distribution of yields from single-palm plots was skew in early years but those from plots of 4 or more palms were normally distributed from the start. Plot shape did not affect variability, which generally decreased with size and with age of palm. The mathematical relationships between variability and plot size are discussed. Grouping annual yields reduced variability. Covariance methods, using pre-treatment yield data, increased precision, but up to 4 pre-treatment year's yields were necessary. There was evidence of a 3-year cycle of bearing, but not of biennial bearing.—W.A.I.F.O.R., Benin, Nigeria.

7107. HEMPTINNE, J., AND FERWERDA, J. D.
Influence des précipitations sur les productions du palmier à huile. (**The effect of rainfall on oil palm yields.**)
Oléagineux, 1961, **16**: 431-7, bibl. 11.

Detailed statistical studies lasting 5 years showed that, in the Yaligimba district of the Congo, production by oil palms was related positively to rainfall in the 12 months preceding harvest and varied by about 1 ton per ha. annually as a result. There was a more marked negative relationship, giving a 2·5-ton variation in annual production, with the rainfall 31 months before harvest. Production was highest with an annual rainfall of 1,500–2,000 mm. In the district of Leverville the period for a negative influence of rainfall on yield was 33 months, and yield maxima corresponded to an annual rainfall of 1,500–1,600 mm.—Dép. Rech. Plantations Lever, Congo.

7108. COURSEY, D. G.
Quelques observations sur l'altération de la couleur des palmistes. (**Some observations on the deterioration of colour in palm kernels.**)
Oléagineux, 1961, **16**: 385-8, bibl. 4, illus.

Darkening and browning of palm kernels resulted not only from exposure to high temperatures during sterilization, but also from prolonged storage at moderate temperatures, particularly if the nuts were in large heaps which tended to become heated in the centre.

Papaws.

7109. LANGE, A. H.
Effect of the sarcotesta on germination of *Carica papaya*.
Bot. Gaz., 1961, **122**: 305-11, bibl. 15, illus.

Seeds of papaw, Line-8 Solo, germinated earlier and with a higher percentage after removal of the sarcotesta (the gelatinous envelope surrounding the seed coat) than when the seeds were left intact. Removal of the sarcotesta also resulted in higher germination in the presence of charcoal and when the seeds were washed in tap water for 24 hours. The presence of the sarcotesta reduced the stimulating effect of GA and the inhibiting effects of IAA and sodium NAA on germination. Seeds soaked in fresh papaw fruit juice or in the leachate from papaw seeds germinated poorly.—Pineapple Res. Inst. Hawaii, Honolulu.

7110. BRIMBLECOMBE, A. R.
Scale insects on papaws.
Qd agric. J., 1961, **87**: 163-4, illus.

Infestations caused by 5 species in southern Queensland are always localized and usually of short duration. However, a more serious scale insect, *Aonidiella orientalis*, has been recorded. The only chemical control so far known is white oil, which, under tropical conditions, may be of doubtful value.

7111. KRISHNAMURTHY, G. V.
Pilot plant investigations on papain.
Food Sci., 1960, **9**: 340-1, from *Trop. Abstr.*, 1961, **16**, Abstr. i1207.

When papaw fruits were first tapped at the age of 3 months, 6 tappings within 16 days yielded 25% more papain than 4 tappings within the same period; the growth of the fruits was not affected. Potassium metabisulphite at 0·5% improved sun-dried, but not vacuum-dried, papain. The activity of papain was also increased by KCN but reduced H_2S. Papain packed *in vacuo* retained its full activity during storage for 10 months at 37° C. [See also *H.A.*, 31: 1492.]

Pineapples.

(*See also* 7292.)

7112. GATTONI, L. A.
Nuevo método de propagación de la piña. **(A new method of propagating pineapples.)**
Ceiba, 1961, **9**: 13-20, illus.

The deterioration in the quality of pineapples in El Salvador is attributed to the use of unsuitable material and methods in propagation. Plants producing more than one crown, more that 2–3 shoots in leaf axils well below the fruit and a further 2–3 suckers are unsuitable as sources of cuttings. Plants with large fruits and few suckers should be marked before harvesting, and afterwards the stems be defoliated and cut longitudinally into 4 strips, disinfected in dilute potassium permanganate and placed rind upwards in primary nursery beds, which are rich in organic matter and have been previously fumigated or steamed. The rows should be 10 cm. apart and the rind exposed at soil level. Shoots develop in 3–5 weeks and are ready for transplanting, each with a small portion of the cutting, into larger nurseries after 6–8 weeks. In the dry season irrigation and semi-shade are necessary. The varieties Red Spanish and Natal Queen produce an average of 4, and Smooth Cayenne 3, plants per cutting. The riper the fruit, the fewer are the plants produced; cuttings taken at the flowering stage give rise to up to 6 plants each (i.e. 24 from one stem).—Esc. nac. Agric., Valle de San Andrés, El Salvador.

7113. GOWING, D. P.
Experiments on the photoperiodic response in pineapple.
Amer. J. Bot., 1961, **48**: 16-21, bibl. 19.

The initiation of flowering of Smooth Cayenne pineapple plants is neither strictly a response to photoperiod (day lengths of 10 hr. 51 min.–13 hr. 24 min.) nor to a minimum temperature (minima from 50° to 72° F. in different areas) under natural Hawaiian conditions. Depending on the kind of planting material used and the time of planting, natural initiation of flowering may take place in any month of the year. Slips planted in the autumn generally initiate flowering in December of the following year. However, exposure of an 8-month-old slip-planting to a day length of 8 hours for 40 days starting on 8 September induced flowering, irrespective of night temperatures from about 60 to 80° F. Interruption of the dark period by illumination at 30 f.c. from midnight to 1 a.m. suppressed the inductive effect. Lowering the night temperature to 60° F. was, of itself, non-inductive. Field-grown, 11-month-old plants treated in place responded similarly, in that 25 periods of 8-hr. day length starting on 5 September induced 60% of the plants to flower, and the night illumination suppressed the inductive effect as before. Daily application of 0·12 mg. of the major native pineapple auxin (indole-3-acetic acid) at the beginning of the dark period had no detectable effect on the short-day treatment, and similar application of an antiauxin (4-chlorophenoxyisobutyric acid) did not affect the suppression of flowering by the light-break. Supplemental illumination of field-grown 12-month-old plants to provide a photoperiod of more than 15 hr. daily from 4 November to 30 January did not suppress the natural initiation of flowering which occurred in early December (day length about 10 hr. 50 min.). Smooth Cayenne pineapple is therefore a quantitative, but not an obligate, short-day plant. [Author's abstract.]—Pineapple Res. Inst. Hawaii, Honolulu.

7114. GOWING, D. P., AND LEEPER, R. W.
Studies on the relation of chemical structure to plant growth-regulator activity in the pineapple plant. III. Naphthalene derivatives and heterocyclic compounds.
Bot. Gaz., 1961, **122**: 179-88, bibl. 23.

Results are given of tests on 64 naphthalene derivatives, 92 heterocyclic compounds and 13 miscellaneous materials for their effects on flower induction, flower inhibition and toxicity. [For part II, see *H.A.*, 31: 3367.]—Pineapple Res. Inst., Hawaii, Honolulu.

7115, PY, C.
Quelques tests sur la floraison provoquée de l'ananas. **(Some tests on induced flowering in pineapples.)**
Fruits d'Outre Mer, 1961, **16**: 28.

The product B.O.H. (betahydroxyethylhydrazine) was markedly inferior to NAA or acetylene.

7116. HUANG, Y.-C., FANG, T.-T., AND LIN, R.-S. **A study on the picking maturity of the pineapple.** [Chinese, with English summary 1½ pp.]
Mem. Coll. Agric. nat. Taiwan Univ., 1960, **5**(4): 25-39, bibl. 11, illus.

For use as fresh fruit and for canning pineapples should be picked when the flesh is light yellow and tender, and the flavour not too acid. A microscopic study of the cross section of a sepal from an unripe fruit showed a pink colouration in the cells under the epidermis and green chloroplasts in the spongy tissue. On ripening the pink colour disappeared and the chloroplasts turned yellow.

Rubber trees—general.

7117. RUBBER RESEARCH INSTITUTE OF MALAYA (SPONSORS).
Proceedings of the Natural Rubber Research Conference, Kuala Lumpur, 1960, Rubber Res. Inst. Malaya, 1961, pp. 986, bibls, illus.

The Conference was sponsored by the Rubber Research Institute of Malaya with the support of the Government of the Federation of Malaya and the Rubber Producers' Council of the Federation. The published Proceedings contain nearly 80 papers, which cover the following subjects: nutrition, yield stimulation, ecology and environment (including ground covers and weed control), breeding and selection (including vegetative propagation), pests and diseases, chemistry and technology of dry rubber and latex, latex biochemistry and microbiology, and factory practice. Over 40 papers on agricultural aspects of rubber production are abstracted below.

7118. CLAY, SIR G.
Natural rubber research.
Proc. natural Rubb. Res. Conf., KualaLumpur, 1960, 1961, pp. 57-64.

The present position and future programme reviewed.

7119. COMPAGNON, P.
Sur la contribution des laboratoires I.R.C.V. à la recherche de l'amélioration de la productivité de l'*Hévéa.* **(On the contribution of the I.R.V.C. laboratories to research on the improvement of the yield of hevea.)**
Proc. natural Rubb. Res. Conf., Kuala Lumpur 1960, 1961, pp. 174-82, bibl. 15.

A review of the work carried out at the Instituts des Recherches sur la Caoutchouc au Vietnam et au Cambodge on the control of manurial programmes through tissue analysis, carbohydrate research and the composition of latex.

7120. GEE, G.
New methods of elastomer synthesis and their impact on natural rubber.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 52-6.

Recent developments in the polymerization of isoprene and butadiene are described. It is considered that, although natural rubber is now only one in a range of elastomers, its qualities are so useful that existing resources should continue to be fully utilized in the foreseeable future.

Rubber trees—breeding, propagation and early growth.

(*See also* 7145.)

7121. ROSS, J. M.
Observations on the 1959 hand pollination programme at the Rubber Research Institute of Malaya.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 392-408, bibl. 2.

The main loss of immature fruit was found to occur in the first half of the period between pollination and harvest. Inexperienced pollinators obtained a greater degree of success than experienced, but the latter produced 50% more harvested fruit for each day's work. No appreciable difference in pollination success was found between 6 of the 7 families used, but in the 7th it was significantly lower. The optimum appeared to be 12 pollinations per inflorescence.

7122. BAPTISTE, E. D. C.
Breeding for high yield and disease resistance in hevea.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 430-45, bibl. 17, illus.

The history of the selection and breeding of clones resistant to *Dothidella* in Brazil is reviewed, and those which have been imported into Ceylon are listed and evaluated for resistance to both *Dothidella* and *Phytophthora.* The apparent breakdown of disease resistance in some cases is discussed. —R.R.I.C.

7123. DE SILVA, C. A.
The performance of RRIC clones under Ceylon conditions.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 378-91, bibl. 6, illus., and *Quart. J. Rubb. Res. Inst. Ceylon*, 1961, **37**: 1-12, bibl. 6, illus.

The history of clone selection and breeding in Ceylon since 1936 is reviewed, and the clones RRIC 52, 86 and 88 are briefly described. These are recommended for replanting limited acreages on the larger estates. The problems of *Phytophthora*, *Oidium* and wind damage in relation to clone selection are discussed.—R.R.I.C.

7124. TINLEY, G. H.
Vegetative propagation of clones of *Hevea brasiliensis* by cuttings.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 409-18, bibl. 15, illus.

Successful rooting of leafy cuttings of clones, including the important PB 86 and GT 1, with the aid of mist is reported.—R.R.I.M.

7125. Templeton, J. K.
Some aspects of the growth of hevea buddings.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 297-311, bibl. 4.

Growth measurements are presented showing height, girth and dry weight of budded clones RRIM 501 and 513 for 21 months after cutting back the stocks. The gain in height was discontinuous, but that of girth was continuous and independent of the phases in height growth. In the first 6–9 months growth on the larger stocks was more vigorous, but thereafter the rate of growth in girth and dry weight was independent of stock size, although the height differences persisted. RRIM 501 developed in height and dry weight more rapidly than RRIM 513.—R.R.I.M.

Rubber trees—soil management and nutrition.

(*See also* 7119.)

7126. Tan Hong Tong.
Some aspects of the question of intercropping.
[Indonesian summary ¼ p.]
Menara Perk., 1960, **29**: 203-11.

As a result of experiments on intercropping rice in rubber and oil palm plantations the following recommendations are made: the rice should be planted in strips 1–1½ m. from the main crop, the remaining area being clean weeded; adequate fertilizers for both main and food crops are needed; intercropping should only be practised for 3 years, including the year of planting the main crop; subsequently a permanent cover crop should be established.

7127. Jeevaratnam, A. J.
Comparative studies of the chemical composition of some cover plants.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp, 342-51, bibl. 4.

Of 5 cover crops investigated Guatemala grass (*Tripsacum laxum*) had the lowest N, P, Ca and Mg contents, but the highest total of NPK on account of its large dry matter production. *Pueraria phaseoloides* and *Centrosema pubescens* gave greater amounts of nitrogen than *Mikania scandens*, but *Desmodium ovalifolium* was generally poorer in nutrients. Both non-legumes were high in K, but low in Ca and Mg.—R.R.I.C.

7128. Mainstone, B. J.
Effect of ground-cover type and continuity of nitrogenous fertilizer treatment upon the growth to tappable maturity of *Hevea brasiliensis*.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 362-75, bibl. 11.

The effects were studied of leguminous and natural covers, combined with ammonium sulphate dressings for the first 24 months or for the whole period up to tapping, on the growth and maturing of hevea trees. Trees growing in a mixture of *Centrosema pubescens* and *Pueraria phaseoloides* reached tapping size 12 months earlier than those grown with natural regeneration. The continued application of N had little effect on the cover-cropped trees but reduced the growth period by 7 months under natural cover.—Dunlop Res. Centre, Negri Sembilan.

7129. Watson, G. A.
Covers plants and the soil nutrient cycle in hevea cultivation.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 352-61, bibl. 9.

Compared with grasses, *Mikania scandens* and natural covers, leguminous creepers were found to mobilize larger quantities of N, P and Ca, to increase the N and P contents of the leaves of the hevea trees, and sometimes to induce more vigorous growth in the trees. The probable part played by cover plants in the soil nutrient cycle is discussed.—R.R.I.M.

7130. Tan Hong Tong, Jap Kim Tjong and Lubis, I. P.
***Psophocarpus palustris*, an ideal ground cover for oil palm and rubber.**
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 312-24, bibl. 19, illus.

The use of *Psophocarpus palustris*, a perennial procumbent legume, has become widespread in Sumatra rubber plantations because of its good coverage, excellent N-fixing properties and resistance to pests and diseases. Its high water demands, however, restrict its use to areas in which this is not a limiting factor. The morphology of the plant is described.—Res. Inst. Sumatra Plant. Ass., Medan.

7131. Chandapilla, M. M.
Vegetation sampling in cover plant trials.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 326-41, bibl. 3.

Sampling by a combination of regularly arranged milliacre quadrats and random point contacts is explained and illustrated from field trial regeneration plots. The flora was found to be richest in new plantings and poorest in a replanted area previously abandoned to *Gleichenia* scrub. Most of the invading species show animal seed dispersal. —R.R.I.M.

7132. Wrigley, G., and others.
The possibilities for pre-emergence weed-killers in immature rubber.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 290-5, bibl. 4.

The use of pre-emergence weed control in rubber plantations and its value for ensuring weed free conditions are discussed for (a) the planting rows during tree establishment and (b) the inter-rows during cover-crop establishment. Experimental work still in progress has already shown that simazine can give effective control in both cases with little or no damage to the hevea or to most of the usual leguminous cover crops, but the period of effective action was less than anticipated.—Fisons Pest Control Ltd.

7133. Bolton, J.
The effect of fertilizers on pH and the exchangeable cations of some Malayan soils.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 70-9, bibl. 12.

An outstanding feature of 3 long-term fertilizer trials on hevea was the pronounced reduction of soil pH by the use of ammonium sulphate. Because of the prevalence of Mg deficiency in Malayan soils, the use of $MgCO_3$ to counteract this effect is recommended. The low Mg status of many soils is considered to be the reason for the negative effect of K fertilization on the growth of hevea in these cases. Responses to phosphate fertilization were general when the available P_2O_5 in the soil was below 25 p.p.m.—R.R.I.M.

7134. Gyss, P. R., and Menon, Y. B.
Leaf and latex analysis.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 183-92, bibl. 24, illus.

A schedule is given for the rapid determination of the mineral constituents of tissues. A solution of the ash is passed through a sulphonated phenol cation exchanger, the P is estimated colorimetrically in the effluent and the elute serves for the determination of the K by flame photometry, the Ca and Mg being chelated and titrated.—Socfin Co. Ltd., Malaya.

7135. Fallows, J. C.
The major elements in the foliage of *Hevea brasiliensis* and their inter-relation.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 142-53, bibl. 13.

In the experiments conducted on the Dunlop Malayan estates the normal ranges as proposed by Beaufils were found unsuitable and have been replaced by new values calculated from foliar analyses of the trees. The results also indicate that these values are not optimal.—Dunlop Res. Centre, Negri Sembilan.

7136. Shorrocks, V. M.
Some effects of fertilizer applications on the nutrient composition of leaves and latex of *Hevea brasiliensis*.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 118-41, bibl. 19.

The leaves proved to be more sensitive to changes in nutrient status than the latex; they responded rapidly to N and K fertilizers but relatively little to P. Nitrogen fertilization depressed the K content of the leaves, and rock phosphate caused a marked increase in the Ca content. In general, the effects of N, P, K and Mn fertilizers on both leaf and latex composition preceded those on the growth and yield of the trees by at least a year.—R.R.I.M.

7137. Rosenquist, E. A.
Manuring of rubber in relation to wind damage.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 81-7, bibl. 13.

Applications of N to rubber increase its susceptibility to wind damage, probably by increasing the density of the crown. There is some evidence to suggest that low leaf K and low leaf Mn are associated with increased wind damage. A K deficiency may reduce the strength of immature wood, but the possible role of Mn is quite obscure, [Author's summary.]—Chemara Res. Stat., Seremban, Malaya.

7138. Middleton, K. R.
Inconsistencies in the response of *Hevea brasiliensis* to phosphatic fertilizers in field trials and in pot experiments with soil.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 89-101, bibl. 18, illus.

The pot experiments described showed that superphosphate was a more effective source of P than rock phosphate, but this was not found in the field trials. The addition to the pot cultures of a nutrient medium containing the essential elements N, K, Mg, S and B, any or all of which might be deficient in the field trial soils, is regarded as responsible for the anomaly. [See also *H.A.*, 31: 3380.]—R.R.I.M.

7139. Cocchi, J.
Sur une corrélation entre bore et potassium observée dans les feuilles d'hévéa. (**A correlation between boron and potassium observed in hevea leaves.**)
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961 pp. 102-16, bibl. 13.
Contribution à l'étude des variations des éléments bore et potassium des feuilles d'hévéa. (**A contribution to the study of variations in the elements boron and potassium in the leaves of hevea.**) [English, German, Spanish and Italian summaries 17 lines each.]
Rev. gén. Caoutch., 1961, **38**: 233-40, bibl. 13.

In investigations in Viêt-Nam on PR 107, Tj. 1 and Tj. 16 growing on grey alluvial soil it was found that at the beginning of the rainy season (April-

July): (1) B contents in the leaf were low, (2) K contents were high, and (3) B and K contents varied inversely. During the rainy season (July–September) B contents rose steeply from 2·97 to 5·06 mg., while K contents fell from 1·19 to 0·95 mg., per 100 g. dry matter. From September to December (end of rainy season and beginning of dry season) the B content fell progressively from 5·06 to 4·65 mg., and the K content fell in a nearly regular manner from 0·95 to 0·74 mg., per 100 g. dry matter. In a trial on the clone Waring 4 between 1954 and 1960, in which B was applied annually as 27·8 g. boric acid per tree, in addition to N, P, K and Mg, the K content of the leaves in the B treatment was higher than that of the control, and the K content of the B treatment rose from 114% of the control in 1954 to a mean of 153% for 1955-59. In injection trials with boric acid and copper sulphate on illegitimate AVROS 256 the following tendencies were evident: (1) an increase of 136% in the B content of leaves after boric acid treatment, and (2) an increase in the K content of 12%, which suggested that B injections favour K assimilation.—Inst. Rech. Caoutch., Viêt-Nam.

Rubber trees—tree destruction and diseases.

(*See also* 7122.)

7140. Newsam, A., John, K. P., and Rao, B. S.
Decay of rubber wood.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 503-9.

Poisoned rubber trees are primarily destroyed by wood rotting fungi, aided appreciably by a leguminous ground cover. Insects play only a minor role. For rapid decay 2,4,5-T is preferable to sodium arsenite as an arboricide, and stump poisoning is more effective than tree poisoning.—R.R.I.M.

7141. Hutchison, F. W.
Factors affecting root disease incidence and control in replantings.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 483-95, bibl. 16.

Control of *Fomes lignosus*, *F. noxius* and *Ganoderma pseudoferreum* in replantings by felling and stump poisoning results in more disease incidence than tree poisoning, because cut timber, in the former case, is left on the ground. In stump poisoning control can be improved by covering the stump with a cheap wood preservative.—R.R.I.M.

7142. Riggenbach, A.
Recent progress in the control of the white root disease of hevea.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 468-71, bibl. 5, and *Quart. J. Rubb. Res. Inst. Ceylon*, 1961, **37**: 18-21, bibl. 5.

After extensive investigations Tillex is recommended for control of *Fomes lignosus*. The rhizomorphs on affected roots should be removed, the exposed roots brushed with 1% Tillex liquid in water and the replaced soil saturated with the solution. In recent experiments other mercury-based fungicides, such as Ceresan, Panogen and Verdasan, were also effective. [See also *H.A.*, 29: 1928.]—R.R.I.C.

7143. Jap Kim Tjong.
Risalah penjelidikan sementara daja fungisid Tillex Liquid dan Antimucin WBR di laboratorium. (**Laboratory experiments on the fungicidal activity of Tillex Liquid and Antimucin WBR.**) [English summary ½ p.]
Bull. Res. Inst. S.P.A. **32**, 1960, pp. 10, bibl. 5, and *Menara Perk.*, 1960, **29**: 223-30, bibl. 5, illus.

Both Tillex Liquid and Antimucin WBR were more effective than two carbolineum materials in inhibiting the growth of *Fomes lignosus* and *Ceratocystis fimbriata* in petri dishes. The lowest effective concentration of Tillex was 1% and of Antimucin 0·5%.

7144. Ramakrishnan, T. S.
Experiments on the control of abnormal leaf fall of hevea caused by *Phytophthora palmivora* in South India.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 454-66, bibl. 11, illus.

Although a single pre-monsoon spray of 1% bordeaux has proved consistently effective, the method is difficult to apply under S. Indian conditions. Preliminary work has shown low-volume, oil-based copper sprays to be promising.—Rubb. Bd, Kottayam, Kerala.

7145. Hoedt, T. G. E.
***Dothidella ulei* and the selection and breeding of hevea.**
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 446-51, bibl. 4.

The etiology of South American leaf blight is described. Chemical control with sprays of colloidal Copper Sandoz or Dithane Z-78 is successful, but uneconomic when the trees are above 2 m. in height. Promising results have been obtained in the breeding of resistant clones in Brazil.—Pirelli Plantations, Belém, Brazil.

Rubber trees—latex production and properties.

(*See also* 7134, 7136.)

7146. Andrews, E. H., and Dickenson, P. B.
Observations préliminaires au microscope électronique sur l'ultra-structure des vaisseaux lactifères et du latex dans les tissues jeunes de l'*Hevea brasiliensis.* (**Preliminary electron microscope observations on the ultrastructure of the latex vessel and its contents in young tissue of *Hevea brasiliensis*.**)

Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 756-65, bibl. 33, illus., and *Rev. gén. Caoutch.*, 1961, **38**: 397-402, bibl. 33, illus.

Latex appears to be of cytoplasmic origin, not a vacuolar sap, and mitochrondria and microsomes are likely to be found in it by refinement of the techniques used here. In young plants the rubber particles were found to be spherical and not aggregated.—Natural Rubb. Producers' Res. Ass., Welwyn.

7147. RABINOWITZ, J. L., AND TEAS, H. J.
Biosynthesis of rubber from C^{14}-acetate by stem slices and latex enzyme from hevea.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 777-86, bibl. 14.

By the use of C^{14}-acetate on slices of hevea stem it was shown that the methyl group was 50% more active in latex production than the carboxyl radicle. Step by step degradation of levulinic acid obtained by the action of ozone on rubber, indicated that the basic isoprene unit of rubber originated from acetate methyl carbon atoms and 2 acetate carboxyl carbon atoms.—Univ. Fla., Gainesville.

7148. MCMULLEN, A. I.
A helical polynucleotide template hypothesis for the biogenesis of rubber.
Biochem. J., 1961, **78**: 33P-4P, bibl. 7.

A suggested mechanism for the polymerization of active isoprene.

7149. FOURNIER, P., AND OTHERS.
Relations between the change of sodium $2^{14}C$ acetate into cis-polyisoprene and the presence of malonic acid. [French and English.]
Rev. gén. Caoutch., 1961, **38**: 403-4, bibl. 5.

When $2^{14}C$ sodium acetate is incubated in fresh latex, the proportion of radioactive cis-polyisoprene formed varies in inverse ratio to the amount of labelled malonic acid in the medium. [Authors' summary.]

7150. LOWE, J. S.
The substrate for V.F.A. formation in natural rubber latex.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 822-31, bibl. 8.

The primary substrate for volatile fatty acid is apparently a glucose-amino-acid complex, and its formation is not influenced by quebrachitol.—Dunlop Res. Centre, Negri Sembilan.

7151. BLACKMAN, G. E.
The stimulation of latex flow by plant growth regulators.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 19-51, bibl. 42.

The history of the use of growth substances for agricultural purposes is reviewed, and 5 experiments in which their effects on hevea were investigated are described. These trials afforded evidence that 2,4-C-5-FPA was more effective in increasing yields than either 2,4-D or 2,4,5-T, the average increments produced by a 0·9% concentration being 38·3, 18·0, and 30·7%, respectively. Moreover, 2,4-C-5-FPA was less dependent on the concentration employed, the figures for a 2·7% solution being 39, 33 and 32·5%, respectively. The economic advantages of the use of growth substances for stimulation are discussed.

7152. LEVANDOWSKY, D. W.
Clonal variations in reaction of *Hevea brasiliensis* to stimulation of latex yield and of bark regeneration.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 270-88.

The results of experiments on the effects of yield stimulants on 11 clones in the Firestone Plantations, Liberia, carried out since 1953, are tabulated and discussed. The greatest increase due to stimulants was obtained with the clone BD 10, followed by War. 4, both of which responded to 2,4-D more than to 2,4-5-T.

7153. PUDDY, C. A., AND WARRIAR, S. M.
Yield stimulation of *Hevea brasiliensis* by 2,4-dichlorophenoxyacetic acid.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 194-210, bibl. 5, illus.

It was found possible to apply 2,4-D in an aqueous medium containing inert additives, but with greater difficulty than in a vegetable oil carrier. Panel applications resulted in more uniform and persistent stimulation than bark application, and produced very rapid renewal of the bark. In mature trees a 2-in. monthly panel application gave a 25% increase in yield for 3½ years, but the response of young trees was poor. Although significant correlations were found between yield responses and the K content of leaves and latex, and appeared probable also with leaf Ca and latex Mg and P, differential fertilizer treatment had no effect.—Chemara Res. Stat., Seremban, Malaya.

7154. ALLEN, S. E., AND RHINES, C. E.
Uptake and transport of radiocarbon-labelled 2,4-D and 2,4,5-T from tapping panel applications in hevea.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 241-55, bibl. 11.

The movement of 2,4-D was found to be much more rapid than that of 2,4,5-T. The carboxyl group proved highly mobile, accumulating in the bark, the methylene carbon tending to remain in the wood nearest to the cambium. Upward movement was in the outer wood, downward in the bark. No evidence of direct participation in latex synthesis was obtained.—U.S. Rubb. Co. Res. Center, Wayne, N.J.

7155. Boatman, S. G.

Chromatography and bio-assay of plant growth substances in hevea latex.

Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 256-68, bibl. 14.

The natural and applied growth substances in hevea latex after normal tapping and after stimulation were isolated and tested. It appeared that IAA was converted in the latex into a naturally-occurring indole compound of higher Rf. After 2,4,5-T stimulation there was additional activity in the neutral fraction, but after copper sulphate stimulation no significant changes in bio-assay activity or chromogenic reactions were observed. No clear relationship between growth-substance content and yield in different clones could be established. [For earlier work, see *H.A.*, 31: 5411.]—R.R.I.M.

7156. Taysum, D. H.

Yield increases by the treatment of *Hevea brasiliensis* with antibiotics.

Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 224-40, bibl. 5.

In a series of experiments yield increases were obtained by using various antibiotics, including "Vaseline green" (containing neomycin). A combination of Vaseline green and 2,4,5-T was more effective than either alone. Still more persistent responses than these were obtained when an aqueous bactericidal dressing was added, from which it seems that latex stimulation by growth substances weakens the trees' resistance to bacterial penetration.—R.R.I.M.

7157. de Jonge, P.

Intensive tapping of mature rubber.

Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 211-23, bibl. 7.

Early slaughter tapping experiments have shown that high yields could be obtained from virgin bark above previously exploited tapping panels and also that tapping systems of over 200% intensity did not react well to combination with the application of a yield stimulant. These experiments were followed up by "ladder tapping" experiments which showed that certain clones produce very high yields when tapped in virgin bark at high level above the bark of second renewal. The yield can be increased still further by tapping the trees on one high and one low half-circumference cut at 2-day intervals, but this system appears to be too severe for long-term use on trees of high yield capacity. This has been confirmed in later experiments, in which third daily and alternate daily tapping systems were compared on mixed buddings of 18 years of age at the commencement of the treatments. The trees tapped alternate daily on a high and low panel show clear signs of exhaustion after 2 years of tapping, whereas this is not observed on trees tapped third daily. The possibilities of a resting period and the use of stimulant in combination with the third daily double cut tapping system are discussed. [Author's summary.]—R.R.I.M.

7158. d'Auzac, J., and Pujarniscle, S.

Aperçu sur l'étude des glucides de l'*Hevea brasiliensis* et sur leur variation. (**Some studies on the carbohydrates of *Hevea brasiliensis* and on their variation.**)

Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 154-73, bibl. 8.

No relationship was found between variations in the carbohydrate content of various parts of the tree and the occurrence or frequency of tapping. Evidence was obtained indicating that the sugar of translocation was sucrose. [See also *H.A.*, 30: 4497.]—I.R.C.V., Lai-Khê.

7159. Lowe, J. S.

Preservation of natural field latex.

Trans. Proc. Inst. Rubb. Ind., 1960, **36**: 225-33, bibl. 4, and *Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960*, 1961, pp. 676-83, bibl. 6.

For the processing of latex into latex concentrate it must remain uncoagulated after tapping for periods of up to 24 hours; ammonia is commonly used for the preservation of the latex. Investigations on the efficiency of the field practice of cup and bucket ammoniation have shown that for normal yields of 6 gal. latex per tapper, bucket ammoniation to 0·35% is desirable but sometimes impracticable. In high yielding areas ammoniation is best carried out at the reception centre within 5 to 5½ hours after the start of tapping. Latex from intensively tapped areas and from clones such as BD 5 will contain large amounts of bacterial material, making bucket ammoniation up to 0·5% essential. Cup ammoniation should be used only for latex from clones such as Gl 1, because of their high Mg content and unstable nature.—Dunlop Res. Stat., Batang Malaka, Malaya.

7160. Taysum, D. H.

The establishment of a bacterial population of latex vessels during normal tapping.

Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 858-71, bibl. 9.

The latex in young untapped trees is sterile or near sterile, but shortly after tapping counts of up to 10^8 live bacteria per ml. have been obtained. The implications of these data as regards healthy tree development and the production of antibodies by the tree are discussed.—R.R.I.M.

7161. NGUYEN HUNG CHAT, PUJARNISCLE, S., AND D'AUZAC, J.
Étude de quelques facteurs susceptibles de jouer un rôle dans le développement microbien du latex. **(A study of some factors which may influence the development of bacteria in latex.)**
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 872-86, bibl. 8.

Several constituents in latex stimulate bacterial activity, viz. phosphorus compounds, carbohydrates, proteins and vitamins. It is suggested that further studies are needed on the role played by vitamins and growth substances. The use of bactericides in latex stimulation is discussed. [See also *H.A.*, 30: 4495.]—Inst. Rech. Caoutch., Viêt-Nam.

7162. GYSS, P. R., WOO, C. E. C., AND CHAN SHEE PENG.
Clonal influence on latex foam properties.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 710-25, bibl. 12.

Some clonal latices were found which gave foams with a low compression modulus both with and without admixture with synthetic latex; others reacted unfavourably to the admixture and showed greater variability. The compression moduli also showed seasonal variation, being lower in latex from winter tapping.—Socfin Co. Ltd., Malaya.

7163. SOUTHORN, W. A.
Microscopy of hevea latex.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 766-76, bibl. 33, illus.

A further account of work described in *H.A.*, 31: 5409.

7164. ARCHER, B. L., AND MCMULLEN, A. I.
Some recent studies of the non-rubber constituents of natural rubber latex.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 787-95, bibl. 12, illus.

The detection, isolation and characterization of 4 groups of non-rubber compounds present in freshly tapped natural latex, namely proteins, sulphydryl compounds of low molecular weight, mononucleotide pyrophosphates and nucleoprotein, are reviewed. The technological and biological significance of the first 3 of these groups are briefly discussed. [Authors' summary.]—Natural Rubb. Producers' Res. Ass., Welwyn.

7165. NG TET SOEI.
Isolation and identification of the free amino acids in fresh unammoniated hevea latex.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 809-21, bibl. 20, illus.

Definite identification of 10, with evidence of a further 4.

7166. KARUNAKARAN, A., MOIR, G. F. J., AND TATA, S. J.
The proteins of hevea latex: ion exchange chromatography and starch gel electrophoresis.
Proc. natural Rubb. Res. Conf., Kuala Lumpur, 1960, 1961, pp. 798-806, bibl. 12, illus.

A continuation of studies mentioned in *H.A.*, 31: 5410 and earlier.

Sugar cane—general.

7167. MAURITIUS SUGAR INDUSTRY RESEARCH INSTITUTE.
***Annual Report 1960*,** 1961, pp. 105 + xxxviii, illus.

Cane breeding: The most effective hormones in rooting experiments were 0·45% IAA and Aretan, the latter applied on wooden toothpicks. Promising varieties were M.253/4, M./305/49, M.19/51, M.423/51, M.272/52, Ebène 50/47 and the imported B.41227 and R.397. *Cane diseases:* The addition of 0·25% urea to the hot water treatment for ratoon stunting disease was found to increase the germination percentage, and cuttings taken from the upper third of the cane stalk gave the highest germination after treatment. *Cane pests:* A number of parasites of the 3 borers present in the island were released. *Weed control:* DCMU, alone and with sodium chlorate, was outstanding in the super-humid zone and did not affect cane germination, growth or yield. Other sections of the Report deal with nutrition and soils, cultivation, irrigation and climate.

7168. COIMBATORE.
***Annual Report of the Sugarcane Breeding Institute, Coimbatore, for 1958-1959*,** 1960, pp. 125, Rs. 6·56 or 10s. 3d.

Breeding: Of 17 foreign varieties sent to State research stations for trial in the previous year C.P.29/320, C.P.44/101 and N:Co.351 performed well at Rudrur, Karnal, Shahjahanpur and Lucknow, and Tuc.521, C.P.36/105, C.P.49/50 and N:Co.339 showed promise in the Punjab and U.P. P.O.J. 2878 as pistil parent was observed to transmit "pithiness" to its projeny. *Botany:* Variations in the flowering time of spontaneums were found to be closely associated with the rainfall received during, or just prior to, flowering, and the flowering of the various clones was found to depend on photoperiods related to those of their native latitudes. *Physiology:* The optimum duration of extra dark treatment to induce early flowering was found to be 4–5 hours. Varieties which did not respond to extra dark treatment could be induced to flower by being given a preliminary extra light treatment. *Mycology:* Resistance to red rot was found in 18 Co. varieties, and a majority of the selfed progenies of S.E.S.205A and 205B were resistant. Seedling root rot (*Pythium debaryanum* and *P. graminicolum*) and seedling blight (*Curvularia lunata* and *Helminthosporium halodes*) were successfully controlled by ammoniacal copper carbonate. *Entomology:* Early shoot borer (*Chilotraea infuscatella*) was checked by 3 sprays of 0·2% DDT and BHC w.p. mixture at 21-day intervals. Canes of Co. 1251, 1218, and 1137 were comparatively resistant to internode borers (*Proceras indicus*).

7169. Sastry, S. K., and Chari, A. V.
Sugarcane research in Telangana (Andhra Pradesh)—a retrospect and prospect. Parts I and II.
Indian Sugar, 1961, **10**: 667-71 and 705-11, bibl. 5.

Meteorological data from 20 years' records are reported. The topography, soils and climate of the region are discussed, together with investigations on varietal improvement, germination, manurial trials and cultural practices.—Agric. Res. Stat., Rudrur.

7170. Iyer, S. S.
A preliminary study of the sampling technique for growth observations in sugarcane field experiments.
Indian J. Sugarcane Res., 1961, **5**: 155-61, bibl. 1.

The results of tests indicate that, for both tiller counts and height measurements, the number of sampling units per plot should be increased from 3 to 4, and in any case for height measurements the number of canes measured in each unit should be increased from 2 to 3 or 4.—Sugarcane Res. Stat., Shahjahanpur.

7171. Bernal Cerice, R.
Sistema ponderal-tabulado para hacer estimados de caña. **(The weight-tabulation system for estimating sugar cane yields.)** [English summary 9 lines.]
Mem. XXXII Conf. anu. Asoc. Téc. azucar. Cuba, 1958, pp. 1-8, 293.

The most important feature of the system is the selection of a single plant which represents the average for the whole plantation as regards the number, length and diameter of canes. Other factors to be taken into account are: spacing, topography, soil variation, the age and condition of the cane, the variety, and the moisture and nutrient status of the soil. It is an advantage to know previous yield figures for the same plantation. Tables have been prepared, giving the number of plants per unit area for different spacings, as well as the cane yield per unit area based on the number, diameter, length and weight of canes from the "average" plant and the number of plants per unit area. Examples of the use of these tables are shown.

Sugar cane—breeding and varieties.

(*See also* 7167, 7168.)

7172. Bremer, G.
Problems in breeding and cytology of sugar cane. [Dutch summaries ¾ p. and ½ p.]
Euphytica, 1961, **10**: 59-78, bibl. 19, 121-33, bibl. 10, and 229-43, bibl. 6, illus.

A history of sugar cane breeding in Java, with special reference to disease resistance, chromosome numbers, taxonomy, inter-specific hybrids and colchicine-induced polyploidy.

7173. Fors, A. L.
Breve historia de la eugenesia de la caña de azúcar en Cuba. **(A brief history of sugar cane breeding in Cuba.)** [English summary ⅓ p.]
Mem. XXXIII Conf. anu. Asoc. Téc. azucar. Cuba, 1959, pp. 15-20, 169.

In 1900 the breeding of Cuban sugar cane was restricted to the varieties Criolla, Blanca and Cristalina. Progress from 1906 onwards is described. At present the most important varieties on the island are M.L.3-18, Pepe Cuca and C.693-47.

7174. Babu, C. N.
Inducement of anther dehiscence in Co. 421, a "male sterile" sugarcane variety, by pollen of other genera.
Curr. Sci., 1961, **30**: 113-14, bibl. 1.

Inflorescences of this variety which were dusted with the pollen of *Euchlaena mexicana*, *Coix lachryma-jobi*, *Narenga porphyrocoma* or *Sclerostachya fusca*, and also those treated with an extract of *Euchlaena* pollen, and bagged, showed profuse dehiscence 4 days later.—Sugarcane Breed. Inst., Coimbatore.

7175. Domínguez Llarena, G.
Obtención de nuevas variedades y resumen de esa labor, en la Estación Experimental de la Caña de Azúcar en Jovellanos. **(The breeding of new varieties, and a summary of this work at the Jovellanos Sugar Cane Experimental Station.** [English summary ¼ p.]
Mem. XXXIII Conf. anu. Asoc. Téc. azucar. Cuba, 1959, pp. 21-5, 169.

Technique and results.

7176. Barreto Domínguez, R.
Resultados obtenidos en los estudios comparativos de variedades realizados por la Estación Experimental de la Caña de Azúcar de Jovellanos en la zafra de 1958. (V). **(Results of variety trials carried out by the Jovellanos Sugar Cane Experimental Station during the 1958 cropping season. (V).)** [English summary 6 lines.]
Mem. XXXII Conf. anu. Asoc. Téc. azucar. Cuba, 1958, pp. 21-6, 294, bibl. 2.

Cane and sugar yields are recorded for 42 varieties, 8 of which were tested in two localities.

7177. Barreto Domínguez, R., Domínguez Llarena, G., and Valdivieso, A. S., Jr.
Resultados obtenidos en los estudios comparativos de variedades realizados por la Estación Experimental de la Caña de Azúcar de Jovellanos en la zafra de 1959 (VI). **(Results of variety trials carried out by the Jovellanos Sugar Cane Experimental Station during the 1959 cropping season. (VI.))** [English summary ⅓ p.]
Mem. XXXIII Conf. anu. Asoc. Téc. azucar. Cuba, 1959, pp. 33-4, 170.

Of 25 varieties listed the best 5, in order of merit, were C.236-51, C.693-47, P.R.980, C.197-52 and C.146-52.

7178. Calma, V. C., and others.
The performance of the plant cane and first ratoon of twenty hybrid seedling clones produced in the College of Agriculture, Central Experimental Station, College, Laguna.
Sugar News, 1960, **36**: 583-9, bibl. 1.

Following comparison with H.37-1933 and P.O.J. 3016 14 varieties are recommended for further testing.

7179. Cheng, C.-P.
Stem epidermal patterns of Taiwan sugarcane varieties. [Chinese, with English summary 1 p.]
J. agric. Ass. China, 1960, No. 31, pp. 34-41, bibl. 7, illus.

A study of 43 "F" varieties is reported, and 3 additions to the 6 standard patterns and criteria used for classification are described.—Nat. Taiwan Univ.

7180. Anon.
Triton, a promising new cane.
Aust. Sugar J., 1960, **52**: 220, illus.

Previously known as 47B.N.1843 and derived from Co.270 pollinated by Eros, this new 2-year variety has the qualities of sure and speedy germination, good early coverage, high yield, disease, flood and frost resistance, clean burning and vigour on poor to medium soils, but sometimes arrows at 1 year and is inclined to lodge.

Sugar cane—planting, nutrition and cultivation.

(*See also* 7167, 7210, 7261, 7268.)

7181. Ilaga, M. T., Calma, V. C., and Landicho, B. M.
Growth and tillering performance of single bud, single point and double points prepared from mature first-year sugar cane seedlings.
Sugar News, 1961, **37**: 13-16, bibl. 7.

Single bud cuttings gave the least, and double points (8 buds) the highest, number of tillers both at 4½ months and at maturity, but the increased number of tillers was not directly proportional to the number of buds. Plants from single bud cuttings were shorter at maturity than those of single (4 buds) and double points, which were the same size as one another.

7182. Rao, M. S. S., and Prasad, R. B.
Studies in India on the germination of sugarcane—a review.
Indian J. Plant Physiol., 1960, **3**: 181-94, bibl. 76.

Including effects of variety, soil moisture, temperature, nutritional status, growth substances, cultural practices and pre-planting treatment.

7183. Singh, H., Adlakha, P. A., and Gill, H. S.
Effects of Aretan on sugarcane (flat sowing).
Indian J. Sugarcane Res., 1961, **5**: 124-5, bibl. 16.

Setts soaked in 0·5% or 1% Aretan solution for 10 min. germinated more quickly, and showed a higher total germination, than unsoaked controls, but 24-hour soaking in water was only slightly less effective. Juice quality was not affected, but yield differences favoured Aretan treatment, although these differences were not significant.—Sugarcane Res. Stat., Jullundur.

7184. Sorensen, H. G.
Experiencias sobre el uso de abono. **(Experiments on the use of fertilizers [for sugar cane].)** [English summary 10 lines.]
Mem. XXXII Conf. anu. Asoc. Téc. azucar. Cuba, 1958, pp. 9-13, 293.

The major nutrient requirements of sugar cane may be satisfactorily determined by manurial trials comparing the effects of NP, NK and PK with those of NPK, using 3 plots for each treatment. Numerical examples from 2 different soils show how the yield responses to N, P and K are used to calculate the optimal ratio of these nutrients. As Cuban soils are mostly rich in Ca and Fe, the fertilizer should be banded to minimize P fixation. Irrigated cane needs about 20% more fertilizer than non-irrigated cane.

7185. Valdivieso, A. S., Jr.
Efectos de tres niveles de fertilización con nitrógeno, fósforo y potasio en suelo arcilla Matanzas. **(The effects of manuring [sugar cane] with three levels of nitrogen, phosphorus and potassium on Matanzas clay soil.)**
Mem. XXXII Conf. anu. Asoc. Téc. azucar. Cuba, 1958, pp. 27-31.

There was no significant response of sugar yield to K on this soil, but with N at 2,500 and P_2O_5 at 6,634 lb. per caballería (32·89 acres) there was evidence that the response to these 2 nutrients was still below the possible maximum.

7186. Clarke, R. T.
A manurial trial on sugar.
E. Afr. agric. For. J., 1961, **26**: 184-6, bibl. 3.

Sulphate of ammonia was applied at 0, 3, 6 and 9 cwt./acre immediately after cutting or during the short rains, and either to the trash from the previous crop or to the soil beneath it. The 3-cwt. application increased yields from 41·3 to 51·3 tons per acre, but no further increases were produced with the 6- and 9-cwt. levels. No difference in yield resulted from different methods or times of application.—Dep. Agric., Kenya.

7187. Ayres, A. S., and Hagihara, H. H.
Effectiveness of raw rock phosphate for sugar cane.
Soil Sci., 1961, **91**: 383-7, bibl. 15.

The availability of raw rock and superphosphates, both banded and mixed with the soil, was compared on P-deficient soils of pH 4·1, 5·0 and 6·1. The test was conducted in pots of 8 cu. ft. capacity and the crop grown for a period of 1 year. Severalfold increases in yield over the controls were obtained from both forms of P with both methods of placement and on all 3 soils. Superphosphate mixed with the soil was at least as effective as when localized immediately beneath the seed pieces. Raw rock phosphate mixed with the soil gave significantly greater yields than the same material banded. Where raw rock and superphosphates were both banded, the latter produced higher yields in all instances. Raw rock phosphate mixed with the soil proved as effective as superphosphate similarly applied with 2 of the soils, but was inferior with the third. Raw rock phosphate mixed with the soil significantly out-yielded banded superphosphate on 1 soil, gave somewhat better yields on another, and on a third soil was moderately inferior to superphosphate. On a basis of cost per unit P_2O_5 raw rock phosphate was superior to superphosphate on all 3 soils. The availability of raw rock phosphate was found to be inversely related to soil pH as well as to the level of exchangeable Ca and the degree of Ca saturation. Despite extreme deficiences of soil P, the P content of plants was only slightly higher where P was applied than where it was omitted. [From authors' summary.]—Hawaiian Sugar Planters' Ass. Exp. Stat., Honolulu.

7188. Vallance, L. G.
A droopy top trial.
Cane Grs' quart. Bull., 1961, **24**: 85.

On a sandy soil deficient in copper an experiment on a plant crop of the variety Comus showed dressings of 28, 42, and 56 lb. $CuSO_4$ per acre to be sufficient, but 14 lb. barely sufficient, to correct the Cu deficiency. An application of 5 tons of cane molasses proved equally efficacious.

7189. Singh, A.
Manganese deficiency of sugarcane.
Sci. and Cult., 1961, **27**: 102-3, bibl. 5, illus.

Manganese contents of 125 and 35 p.p.m. were found in leaf blades from healthy and unhealthy plants, respectively. Contents of Mn in other tissues from unhealthy plants were also lower than normal. Spraying with manganese sulphate (125 and 250 p.p.m. Mn) had some effect.—Indian Inst. Sugarcane Res., Lucknow.

7190. Parthasarathy, S. V.
Value of trash in cane culture.
Indian J. Sugarcane Res., 1961, **5**: 96-100, bibl. 7.

Cane trash may be used to add 10 lb. N per acre in fields situated near the factory. Manual handling has been found most satisfactory, particularly in ratoon crops.—Thiru Arooran Sugars Ltd., Vadapathimangalam, Madras.

7191. Saplala, V. L.
The effect of varying amounts of CMU and TCA + 2,4-D on the yield of POJ 3016.
Philipp. Sugar Inst. Quart., 1960, **6**: 95-101, bibl. 10, from *Trop. Abstr.*, 1961, **16**, Abstr. i 1520.

Various amounts of CMU and combinations of TCA + 2,4-D were applied one week after planting the cane. The herbicides had a favourable effect on the weight of millable stalks and the yield of sugar per ha. when compared with hand weeding. The chemically treated plots showed less weed growth and greener foliage than the hand-weeded plots. Isolated cases of chlorotic spots on the cane leaves, which were apparently caused by the herbicides, were observed, particularly on the TCA + 2,4-D treated plots.

7192. Parthasarathy, S. V.
Mechanised cane farming.
Indian J. Sugarcane Res., 1961, **5**: 119-23.

Comparative operating costs are tabulated for various types of large tractor, and suggestions made for the mechanization of various cultural operations.

7193. Anon.
Mechanical aids in Queensland cane farming practices.
Aust. Sugar J., 1960, **52**: 617-20, illus.

Photographs of new toppers and loaders in action.

7194. Cueto Robayna, C. B.
Un estudio sobre retoños quedados. (**A study of cane left uncut.**) [English summary 10 lines.]
Mem. XXXIII Conf. anu. Asoc. Téc. azucar. Cuba, 1959, pp. 1-5, 168.

Cane which is left uncut becomes a reservoir for borer infestation and develops so many new shoots that subsequent harvesting is impeded. As these shoots are less than a year old at harvest time their sugar yield is below that of normal ratoons. It is thus highly uneconomic to leave cane standing from one year to the next.

7195. ANON.
Que debe hacerse con la caña helada que ha quedado en pié? **(What should be done with frost-damaged sugar cane that has not been harvested?)**
Circ. Estac. exp. agríc. Tucumán **160**, 1960, pp. 8.

Disposal by burning and/or ploughing under.

Sugar cane—sugar and starch formation.

7196. GLASZIOU, K. T.
Accumulation and transformation of sugars in sugar cane stalks.
Plant Physiol., 1960, **35**: 895-910, bibl. 7.

When the source of radioactivity was $C^{14}O_2$ fed to a leaf attached to a sugar cane stalk, or C^{14}-labelled sucrose in a solution bathing internodal tissue discs, the pattern of labelling in the sugars in internodal tissue was similar. The rates of accumulation for sucrose and glucose in tissues from very young internodes were 6 and 15 times higher, respectively, than for tissues from mature internodes. The ratio of the accumulation rates, glucose to sucrose, varied from 3·4 to 9·7. Whether sucrose or glucose was supplied in the medium, most of the C^{14} appearing in the sugars was found to be in sucrose. Degradation of the sucrose accumulated into tissue discs from young internodes which had incubated in a C^{14}-labelled glucose solution showed that the glucose and fructose moieties were approximately equally labelled. This tissue contained a large pool of unlabelled fructose, so that sucrose was synthesized at a locus which was not in rapid equilibrium with the fructose pool. When immature tissue discs were placed in distilled water, the relative proportions of the sugars in the tissue were distinctly different from the sugars leaking into the medium. The results indicated that the immature tissues are 8 to 10 times more permeable to reducing sugars than to sucrose. Fructose was the major component of the reducing sugars leaking to the medium. The rate of efflux of sugars from tissues in water was not closely correlated with the sugar content of the tissue. The rate first decreases, then increases, with increased maturity of the tissue. There was no significant effect of sucrose solutions at concentrations up to 2% on the rate of efflux of sugars from tissue discs. $C^{14}O_2$ was fed to the fifth leaf of a stalk and the stalk was defoliated 24 hours later. Measurements of the mobilization of sugars in the fifth internode as indicated by the movement of the C^{14} showed that 75% of the sugar was removed within 48 hours from defoliation. The rate of loss of sucrose was approximately constant over the first 24 hours following defoliation, although in the same period the sucrose content declined by 77%. The results suggested that sucrose may act as a source of glucose and fructose. The rate of loss of sugar was of the same order as efflux from tissue discs in water. When tissue which had accumulated sugar from a C^{14}-labelled glucose solution was transferred to water, labelled sucrose appeared in the water in less than a minute. Changes in the rate of efflux of sucrose indicated that there was more than one sucrose pool within the tissue. Several possible mechanisms to explain sugar transformations and accumulation are discussed. A working hypothesis is presented entailing a carrier which mediates the accumulation process and is located in a permeability barrier separating the outer and inner space of the tissue. The barrier is logically identifiable with the tonoplast membrane. [Author's summary.]—Hawaiian Sugar Planters' Ass. Exp. Stat., Honolulu.

7197. RAO, K. C., AND AIYAR, K. V. G.
On the starch content of some *Saccharum spontaneum* variants.
Curr. Sci., 1961, **30**: 113, bibl. 2.

The starch contents of the 14 variants studied appeared to vary according to geographical distribution, those from nearer the equator having less. [See also *H.A.*, 31: 5522.]—Sugarcane Breed. Inst., Coimbatore.

Sugar cane—diseases and pests.

(*See also* 7167, 7168, 7194.)

7198. TABAYOYONG, F. T.
Cane diseases and pests and their control 1957-1959.
Sugar News, 1961, **37**: 61-7.

In the period under review leaf scorch has been brought under control by the replacement of H.37-1933 with resistant varieties; the damage due to the woolly aphis *Oregma lanigera* has been drastically reduced by the use of systemic insecticides; and BHC applications have almost eliminated injury from the grubs of *Leucopholis irrorata*. On the other hand, lack of effective rat poisons led to an increase in damage from 4% in 1957-58 to 9% in 1959-60, and the biological control of various moth borers by releases of the parasites *Trichogramma australicum* and *T. japonicum* has not been as effective as was expected.—Victorias Milling Co.

7199. BIRD, J.
Further studies on transmission of the causal agent of the chlorotic-streak disease of sugarcane. [Spanish summary ¼ p.]
J. Agric. Univ. P.R., 1961, **45**: 8-18, bibl. 18, illus.

Healthy plants developed symptoms of chlorotic streak when grown together with diseased plants in wet quartz sand, when grown in soil taken from around infected plants and also when grown together with infected Napier grass plants in nutrient solution. Mechanical inoculation of the roots of healthy plants with extracts from the roots of infected plants did not, however, transmit the disease. [For an earlier work, see *H.A.*, 29: 4102.]

7200. EGAN, B. T.
Chlorotic streak disease can cause poor germinations.
Cane Grs' quart. Bull., 1961, **24**: 101.

The presence of chlorotic streak disease in the setts reduced germination in Pindar from 69 to 58%, in Q.66 from 92 to 83% and in Q.67 from 83 to 65%.

7201. DEAN, J. L.
A spray method for inoculating sugar-cane seedlings with the mosaic virus.
Plant Dis. Reptr, 1960, **44**: 874-6, bibl. 3, illus.

The method is very rapid and has given higher infection rates than the standard rubbing method. Inoculum containing fine sand is applied by an atomizer operating at a pressure of 120–150 p.s.i.

7202. BIRD, J.
Inoculation of sugarcane plants with the mosaic virus using the airbrush. [Spanish summary 3 lines.]
J. Agric. Univ. P.R., 1961, **45**: 1-7, bibl. 7, illus.

Easier to use and more efficient than the standard Matz pin-thrust method.

7203. (ABBOTT, E. V.)
Sugarcane virus is named strain H.
Agric. Res., Wash., 1961, **9**(9): 15.

All commercial varieties are susceptible to this mosaic virus which causes leaf chlorosis and stunting. The disease is confined to Louisiana.

7204. FORS, A. L.
Tanque portátil para el tratamiento de semilla de caña. **(A portable tank for seed cane treatment.)** [English summary ¼ p.]
Mem. XXXIII Conf. anu. Asoc. Téc. azucar. Cuba, 1959, pp. 27-32, 170, bibl. 8, illus.

This steel tank designed for the hot-water treatment of cane is 11 ft. × 3 ft. × 3 ft. 4 in. deep. It can be used either for uncut stems, or divided into 6 sections by metal crates, each with a capacity of 600 setts. The hot water is circulated by a petrol-driven motor, and the whole apparatus fits conveniently onto a cane transport wagon. The apparatus is operated by 2 men. It increased the cost of planting by 13% when tested with inexperienced workers.

7205. VAN DER ZWET, T., FORBES, I. L., AND STEIB, R. J.
Studies on the *Phytophthora* rot of sugarcane seed pieces in Louisiana.
Plant Dis. Reptr, 1960, **44**: 519-23, bibl. 7, illlus.

The pathogens involved are *P. erythroseptica* and the more virulent *P. megasperma*. Cold, wet weather is essential for an appreciable infection. Susceptible, resistant and intermediate varieties are listed.

7206. RAO, G. N.
Some observations on the root-knot nematode (*Meloidogyne javanica*) on sugarcane at Coimbatore.
Sci. and Cult., 1961, **27**: 94-6, illus.

Symptoms of yellowing and stunting are recorded on plants growing in infected soil.

7207. RANGASWAMI, G., BALASUBRAMANIAN, M., AND VASANTHARAJAN, V. N.
The host range of sugarcane root-knot nematode *Meloidogyne javanica* (Trueb) Chitwood.
Curr. Sci., 1961, **30**: 149-50, bibl. 3.

Found in 10 of the 21 indigenous plants examined.

7208. CLEASBY, T. G.
Notas sobre la reacción de la caña de azúcar a la fumigación del suelo en Natal. **(Notes on the reaction of sugar cane to soil fumigation in Natal.)**
Mem. XXXII Conf. anu. Asoc. Téc. azucar. Cuba, 1958, pp. 33-6.

Poor growth and low yields of sugar cane on the sandy coastal soils of Natal, South Africa, were remedied by soil fumigation with various nematicides. Preliminary experiments suggest that it is better to fumigate before planting than after harvesting. *Meloidogyne javanica* has been identified as a common nematode in these soils, and further control experiments are in progress.

7209. BUTANI, D. K.
Insect pests of sugarcane in Bihar: Parts I and II.
Indian Sugar, 1961, **10**: 649-54, bibl. 12, illus., and 765-8, 779-81, bibl. 17, illus.

In part I the major pests and parasites are listed, and the damage caused, bionomics and control measures for root borer (*Emmalocera depressella*), shoot borer (*Chilotraea infuscatella*), stem borer (*Chilo tumidicostalis*) and top borer (*Scirpophaga nivella*) are described. Part II deals with leaf hopper (*Pyrilla perpusilla*), various termites, white flies and beetle larvae—Bihar agric. Coll., Sabour.

7210. JAGANNATHARAO, E., AND JAGANNATHARAO, R.
Some studies on the control of shoot borer (*Chilotraea infuscatellus* Snell) in Bibbili Tract (Andhra Pradesh).
Indian J. Sugarcane Res., 1961, **5**: 149-54, bibl. 10.

Planting in deep furrows and trash blanketing both considerably reduced the incidence of shoot borer. Co.419 was more susceptible to borer attack than were Co.449 and Co.527. Endrin at 0·02% and

DDT at 0·32% effectively controlled attacks, 2 sprays being adequate.

7211. SINGH, O. P., AND SANDHU, J. S.
Preliminary studies on the translocation of gamma BHC in sugarcane and its residual effects.
Indian J. Sugarcane Res., 1961, **5**: 142-5, bibl. 8.

Gamma BHC applied in liquid form to the soil was translocated in the sugar cane plants, and toxicity to borers (*Chilotraea* spp.) was maintained for about 4 months after applications of 1–5 lb. per acre. The sucrose content of the juice from treated plants was higher than that from control plants.—Sugarcane Res. Stat., Jullundur.

7212. KALRA, A. N., AND SIDHU, A. S.
Further studies on the chemical control of sugarcane top borer.
Indian J. Sugarcane Res., 1961, **5**: 138-41, bibl. 3.

Endrin at 0·1% or 0·2% was most effective in controlling attacks by top borers (*Scirpophaga nivella*). Combinations of endrin with cheaper insecticides (BHC, ryania) and dieldrin were tested to discover if spraying costs could be reduced, but yield increases depended on the total quantity of endrin applied and were little affected by additives. —Sugarcane Res. Stat., Jullundur.

7213. SKINNER, S. O.
Greyback cane beetle: a review of the position in the Innisfail district after ten years of benzene hexachloride usage.
Cane Grs' quart. Bull., 1961, **24**: 83-4, illus.

This pest continues to breed prolifically, and plantations close to grassland and waste areas are particularly vulnerable. The general use of BHC and the effective control it gives have led to some carelessness in application and distribution, which may result in unobserved losses in the ratoon crops through population build-up.

Tea—general.

7214. NYASALAND.
Annual Report of the Tea Research Station for 1959/60, 1961, pp. 40.

Agronomy. Different shade treatments had no pronounced effects on soil moisture at 1 ft. depth, but *Albizzia gummifera* caused pronounced moisture depletion at 5 ft. and 10 ft. Annual pruning gave higher annual yields than 2- or 3-year cycles, but over the 8 seasons of the trial, a 3-year cycle combined with an application of 120 lb. N per acre outyielded all other treatments. For young tea lighter pruning gave higher yields than clean pruning. In the various fertilizer experiments significant responses were obtained only to N dressings. In spacing experiments yields per acre at all ages plotted against plant populations produced yield curves that were still rising at 8,000 plants per acre, indicating that the optimum population had not yet been reached. In shade tree trials *Gliricidia maculata* and *Albizzia gummifera* significantly reduced yields compared with *Grevillea robusta* and no shade. For *Armillaria mellea* control 2,4,5-T proved more effective as an arboricide than 2,4-D. *Plant improvement:* For the 3rd year in succession results indicated that survival is higher when cuttings are taken from bushes in a predominantly dormant state. The use of NAA at 32 p.p.m. on cuttings did not increase survival but caused significant increases in the number and length of roots per cutting. Mist propagation greatly accelerated the formation of roots, and there was little difference between continuous and intermittent mist.

7215. INDIAN TEA ASSOCIATION, SCIENTIFIC DEPARTMENT.
Annual Report of the Tocklai Experimental Station for 1959, [1960], pp. 396.

Physico-chemical branch: Yield responses to altered manurial treatments were shown to be exponentially related to the time elapsing after alteration. Shade tree cover continued to have a beneficial effect on the soil-N status. The loss of Ca through the continuous application of ammonium sulphate during the last 4 years worked out at 23 parts of $CaCO_3$ for 100 parts of ammonium sulphate applied. The uptake of P from applied superphosphate by a cover of *Crotalaria* was linear and in the region of 10%. *Botanical branch:* Light intensity markedly affected the ratio of pluckings to prunings in 4 clones tested. In samples of tea made separately from the stem and the leaf with bud, the stem tea consistently showed higher quality than the leaf. *Agricultural branch*: Urea proved less effective than sulphate of ammonia as a source of N in most experiments. In one long term NPK experiment PK proved beneficial, in another neither P, K nor PK had any effect. Under shade lower levels of P tended to increase, and higher levels to reduce, yields. *Centrosema pubescens* proved to be a satisfactory ground crop for fallow areas and should replace *Calopogonium mucunoides* in dry places. *Plant pathology branch:* Tedion and malathion proved the most effective ovicides in red spider control, Kelthane and malathion the best for control of the active stage. Endrex was superior to Aldrex for the control of looper caterpillar. Of four fungicides tested against *Corticium invisum* Dithane M-22 proved the most effective. Nemagon, Nematox and Basudin proved effective in increasing the number of usable transplants in a nursery soil infested with nematodes. Several articles, published as appendices to the report, are abstracted separately below.

7216. Harler, C. R.
Tea production in Caucasia.
World Crops, 1961, **13**: 142-4, illus.

Climate, crop distribution, processing and varieties briefly described.

7217. Guinard, A.
Possibilités de production de thé et systèmes culturaux dans la région de Man (Côte d'Ivoire). **(The possibilities of tea production and cultural systems in the region of Man, Ivory Coast.)**
Café, Cacao, Thé, 1961, **5**: 3-10, illus.

The soil and climate would suit tea, but for economic, technical and sociological reasons it would not be advisable to introduce the crop.

7218. Wight, W., and Gilchrist, R. C. J. H.
The concept of kind of tea.
Nature, 1961, **191**: 14-16, bibl. 13.

A discussion on quality and strength in relation to Assam, Darjeeling and Ceylon types based on *C. sinensis* var. *assamica*, *C. sinensis* var. *sinensis* and their hybrids.

Tea—propagation, environment and growth.

(*See also* 7215, 7289.)

7219. Mamedov, M. A.
Tea selection in Azerbajdžan. [Russian.]
Agrobiologija, 1961, No. 1, pp. 62-7, illus.

Seed production by tea in Azerbajdžan, which is usually poor, was increased 25-fold by irrigating thrice yearly. The seeds produced were larger and showed improved germination and seedling growth. By selecting seedlings with medium (97 mm. long) or large (101 mm.) leaves yields of leaf per bush were much increased by comparison with unselected (85 mm.) seedlings. Some of these selected seedlings also showed improved winter hardiness.

7220. UPASI Tea Scientific Department.
Are hormones useful in rooting of tea cuttings?
Plant. Chron., 1961, **56**: 77, bibl. 1.

A quick dip in a solution of 5,000 p.p.m. IBA in 50% alcohol accelerated root formation.

7221. Kawai, S., and Morita, N.
On the fluctuation of soil moisture content in the tea garden. [Japanese, with English summary $\frac{1}{4}$ p.]
Study of Tea, 1960, No. 23, pp. 70-6, bibl. 4.

Moisture contents of both surface and sub-soil were more variable in young tea than in mature gardens.

7222. Barua, D. N.
Soil fertility and illumination response of tea bushes.
A.R. Tocklai exp. Stat. 1959, [1960], pp. 64-8, bibl. 2.

The results are given of experiments on the effect of reduced illumination on the yield of unmanured tea. Over 10 years on soils of low fertility yields under 50% light intensity were 65–135% higher than in full sunlight. In another small experiment on a richer soil, however, full sunlight gave greater plucking and pruning weights than 55% illumination.

7223. Kawai, S., and Ikegaya, K.
Relationship between the saturation degree of exchangeable calcium, potassium and magnesium of the soil and the growth of the tea plant. Part 3. Effect of the saturation degree of exchangeable calcium on the microbiological activities of tea soil. [Japanese, with English summary $\frac{1}{3}$ p.]
Study of Tea, 1960, No. 23, pp. 76-81, bibl. 11.

Studies of the ammonifying, nitrifying, cellulose- and sucrose-decomposing activities of soils with differing degrees of exchangeable Ca saturation indicated 25% saturation to be a suitable level for adequate microbiological activity. [For part 2, see *H.A.*, 31: 1609.]

7224. Wight, W.
Environmental variation of the tea plant.
A.R. Tocklai exp. Stat. 1959, [1960], pp. 87-97, bibl. 12.

The phloem index is taken as the standard count of druses of calcium oxalate in the leaf petiole, and non-genetic changes in this index were induced by differences in locality and in top-dressings, manganous sulphate having the greatest effect followed by magnesium sulphate. The influence of the sulphates of Na, Ca, Cu and Zn and of sulphur itself was less noticeable.

7225. Nakayama, A., and Harada, S.
Morphological study on the growth of tea buds. Part I. The growth process of terminal and axillary buds. [Japanese, with English summary 11 lines.]
Study of Tea, 1960, No. 23, pp. 1-5, bibl. 4, illus.

Winter buds were found to have 2 bracts and 6–7 leaves. Leaf differentiation started in early April, and by late May 6 leaves had differentiated in terminal buds and 4 in axillary buds.

7226. Takahashi, T., and Yanase, Y.
Studies on flower bud differentiation in the tea plant. Part 3. The influence of temperature. Part 4. The influence of day length and light intensity. [Japanese, with English summaries $\frac{1}{3}$ p. each.]
Study of Tea, 1960, No. 23, pp. 6-11, bibl. 4, illus., and 12-16, bibl. 3.

Flower bud development was hastened by an increase in the mean maximum air temperature, and more particularly by the night temperature, the minimum temperature sum between the beginning of shoot development and flower differentiation being 800° C. Low temperatures at the time of flower differentiation not only retarded development, but altered it to leaf differentiation in some cases. The total N and carbohydrate contents and the C/N ratio of the developing shoot were also affected by air temperature. In the 1st and 2nd plucking seasons long-day treatment (22 hours) retarded, whereas short-day treatment (8 hours) accelerated, flower development. Low light intensity increased the number of flower buds, but reduced the carbohydrate content and the C/N ratio of the plants. [For part 2, see *H.A.*, 30: 4566.]

Tea—diseases and pests.

(*See also* 7215.)

7227. AGNIHOTHRUDU, V.
Investigations on tea flower disease.
A.R. Tocklai exp. Stat. 1959. [1960], pp. 190-213, bibl. 12.

A series of experiments was carried out to determine the antagonistic action of various fungi on the *Botrytis* sp. associated with this disease. Only *Cladosporium herbarum* among 15 tested proved seriously antagonistic, and the antagonism here was not complete. [See also *H.A.*, 30: 4582.]

7228. VISSER, T., SHANMUGANATHAN, N., AND SABANAYAGAM, J. V.
The influence of sunshine and rain on tea blister blight, *Exobasidium vexans* Massee, in Ceylon.
Ann. appl. Biol., 1961, **49**: 306-15, bibl. 18.

The germination of spores of *E. vexans* required moisture, but 0·1 in. of rain in a day was sufficient for a high germination percentage; more rain did not materially increase germination. Spores were killed by sunshine of a few hours' duration, even if there was adequate rain on the same day. An average of about 3¾ hours of sunshine per day over 5 days was sufficient to reduce the disease to sub-economic levels. Spraying with copper fungicide at 10-day intervals usually gave adequate control but added to the cost of production. A method is suggested of using recorded sunshine hours as the criterion in deciding on the frequency of spraying [see *H.A.*, 30: 3003]. [From authors' summary.]—Tea Res. Inst., Ceylon.

7229. S[ARMAH], K. C., AND G[LOVER], P. M.
Branch die-back and *Nectria*.
Ser. Tea Res. Inst., Tocklai, **65/3**, revised 1960, pp. 4.

The recommended treatment for tea bushes infected with one of the parasitic species of *Nectria* is to prune back to a point not less than 4 in. below the lowest limit of die-back on the affected branch, during the period between Mid-November and mid-December only. A large area of tea should then be sprayed with a 5% solution of Ovicide within 24 hours, but a limited number of bushes can be treated by painting the cut surfaces with a 5% solution of a copper fungicide.

7230. S[ARMAH], K. C.
Branch canker (*Poria hypobrunnea* Petch) following sun-scorch and branch damage.
Ser. Tea Res. Inst., Tocklai, **68/2**, revised 1960, pp. 3.

Methods of preventing sun-scorch in medium-pruned tea are described. The penetration of damaged branches by wound parasites can be prevented by painting with lime-sulphur, copper fungicide or bitumen.

Tea—quality and composition.

7231. WIGHT, W., AND GILCHRIST, R. C. J. H.
Concerning the quality and morphology of tea.
A.R. Tocklai exp. Stat. 1959, [1960], pp. 69-86, bibl. 10.

In populations of tea grown in N.E. India quality, as assessed by tasters, was found to be associated with hairs on the leaf lamina and crystal cells in the phloem. The hairs contain caffeine, and pubescence was positively correlated with xylem density. Crystal cells were more numerous as putative hybridity increased. Quality appeared to have a more or less linear relationship with pubescence and a second order relationship with the number of crystal cells.

7232. DŽEMUHADZE, K. M., AND MILEŠKO, L. F.
Tannins of the large-leaved Hunan tea. [Russian.]
Doklady Akad. Nauk. SSSR, 1961, **136**: 1471-3, bibl. 2.

Plucked leaf of Hunan tea was found to have higher contents of l-epicatechin and l-epicatechin-gallate, and lower contents of l-epigallocatechin and l-epigallocatechingallate, than leaf from varieties of *Thea assamica* and *T. sinensis*. From this it is thought likely that Hunan tea was evolved earlier than the others.

7233. BHATIA, I. S., AND ULLAH, M. R.
Oxidation of l-epicatechin gallate during the processing of Assam tea leaf.
Chem. Ind., Lond., 1961, No. 30, p. 1169, bibl. 6.

7234. ROBERTS, E. A. H.
Oxidation products of l-epicatechin gallate in black teas.
Chem. Ind., Lond., 1961, No. 30, p. 1170, bibl. 5.

Sundry crops.

7235. Mukerjea, T. D., and Govind, R.
Studies on indigenous insecticidal plants: Part II—*Annona squamosa.*
Cheema, P. S., and others.
Indigenous insecticides: Part II—Insecticidal properties of the seed oil of *Annona squamosa* Linn.
J. sci. industr. Res., India, Sect. C, 1958, **17C**: 9-15, bibl. 14, and 132-4, bibl. 7.

An ether extract of the seeds has insecticidal properties but is less toxic than DDT.

7236. Kamp, W.
The determination of the caffeine content of liquid extract of kola and kola seeds by ion exchange.
Pharm. Weekbl., 1960, **95**: 481-6, from *Analyt. Abstr.*, 1961, **8**, Abstr. 1195.

7237. Monge, G. G.
Evaluation of the Averell and Norris method for the determination of parathion in West Indian cherry (*Malpighia punicifolia*, L.).
[Spanish summary ¼ p.]
J. Agric. Univ. P.R., 1961, **45**: 50-3, bibl. 8.

7238. Deb, J. C., and Chandrasekhara, N.
Ascorbic acid concentrate from amla (*Phyllanthus emblica* Linn.).
Food Sci., 1960, **9**: 306-7, bibl. 7, from *Trop. Abstr.*, 1961, **16**, Abstr. i654.

A juice containing 5·3 g./l. ascorbic acid was obtained. Storage losses of ascorbic acid were avoided by preservation with sulphur dioxide.

7239. Joshi, N. J.
Ber grafting in Banaskantha division.
Indian For., 1960, **86**: 169-71, from *Biol. Abstr., Sect. D*, 1961, **36**, Abstr. 38,739.

A successful method of grafting *Zizyphus jujuba* is described, and its practical implications are discussed.

NOTES ON BOOKS AND REPORTS.

Books.

(*See also* 6240, 6779.)

7240. Blake, S. F.
Geographical guide to floras of the world. Part II. Western Europe.
Misc. Publ. U.S. Dep. Agric. **797**, 1961, 9½ × 6½ in., pp. 742, $2.75.

This book is an annotated list of floras, bibliographies and other publications dealing with vascular plants, particularly the useful ones. It contains 3,757 primary and 3,084 subsidiary titles, and also author and geographical indexes. With each title are included details of publication, size and coverage. The first part of the work, dealing with Africa, Australasia and America was published in 1942.

7241. Burnet, F. M., and Stanley, W. M.
The viruses: biochemical, biological, and biophysical properties.
Academic Press, New York and London, 1959, 9½ × 6½ in., in 3 vols., Vol. 1, pp. 609, bibls, illus., £6 8s. 6d., and Vol. 2, pp. 408, bibls, illus., £5 7s. 6d.

Volume 1 deals with general virology and Volume 3 with animal virology. Volume 2, which concerns plant and bacterial viruses, covers the following ground: infection and virus synthesis; plant virus biochemistry, variation and its chemical correlates; cycles of plant viruses in insect vectors; several aspects of bacteriophage; intracellular multiplication of bacterial viruses; and lysogeny.

7242. Commonwealth Mycological Institute.
Herb. I.M.I. handbook. Methods in use at the Commonwealth Mycological Institute.
Commonwealth Mycological Institute, Kew, 1960, 7½ × 5 in., pp. 103, illus., 12s. 6d.

A somewhat cryptic title and a solemn-looking binding and dust cover hardly do justice to the contents of this little book on the Herbarium of the Commonwealth (formerly Imperial) Mycological Institute. Nine very able mycologists have contributed sections covering the Institute and its herbarium, methods of describing a fungus, culture-collection methods, the treatment of pathogenic phycomycetes, bacteria, collecting fungi (tropical species included), the *Index of Fungi*, the *Bibliography of Systematic Mycology*, the *Review of Applied Mycology*, the *Review of Medical and Veterinary Mycology*, and a comprehensive list of the Institute's publications.

The subject matter is presented with a vitality that is completely captivating. Mycologists whom one has known by name become real people, and the history of the C.M.I. makes a very readable adventure story. The wealth of detail and the clear illustrations in the sections on practical work will not only be invaluable to the inexperienced, but will provide the seasoned mycologist with many a hint for saving time and expense and for improving his technique. In these days when the battle of nomenclature in mycology appears to be warming up almost to the temperatures found in acarology and entomology, it is reassuring to find that the C.M.I., while not remaining aloof, is not prepared to "rush in where angels fear to tread". K.C.

7243. Coste, R.
Les caféiers et les cafés dans le monde. Tome second. Les cafés. 2e volume. **(The coffee trees and coffees of the world. Part 2. The coffees. Vol. 2.)**
Editions Larose, Paris, 1961, 11 × 9 in., pp. 383-894, bibls, illus., paper bound (both volumes) 195 N.F., cloth 230 N.F. plus 6.70 N.F. postage.

The first volume of this second part was reviewed in *H.A.*, 30: 3021, and the first part of the whole work in *H.A.*, 26: 4257. This present volume now brings the story to a conclusion with chapters 12 and 13, which deal, respectively, with the world production and consumption of coffee. It is to some extent a geographical study, as, under each country, the ecological conditions and cultural practices are considered as well as the ports, markets and organizations. A vast amount of information has been made available. This volume also contains the indexes to the whole work; these are of authors, subjects and geography. There is also a glossary.

The erudition and labour that have been put into this most comprehensive work cannot easily be exaggerated, and author, collaborators and publishers must feel very considerable and justifiable satisfaction at having so successfully completed this major monograph on coffee. There is no likelihood of its position being challenged for many years. Planters, agronomists, manufacturers and merchants have every reason to be grateful.

G.E.T.

7244. Exell, A. W., and Wild, H. (Editors).
Flora zambesiaca, Vol. 1, Part 2.
Crown Agents, London, 1961, 9½ × 6 in., pp. 337-581, illus., 25s.

The first part of this volume was reviewed in *H.A.*, 30: 3022. This part covers families 21 to 30, Caryophyllaceae to Sterculiaceae.

7245. Gisquet, P., and Hitier, H.
La production du tabac: principes et méthodes. **(Tobacco production: principles and methods.)**
J.-B. Baillière et fils, Paris, 2nd edition, 1961, 9½ × 6½ in., pp. 601, bibls, illus., 58N.F.

The authors of this most comprehensive monograph are, respectively, Honorary Director and Director of Research at the Institut Expérimental du Tabac de Bergerac, a major European centre for tobacco research. This book, however, is not simply an account of European tobacco growing; on the contrary its coverage and treatment are world-wide and remarkably thorough. In certain sections more detail is naturally given to French aspects of the crop, for example, the figures for production and economics and descriptions of varieties, but information from other major producing areas is not curtailed on this account. The research interests of the authors also give a personal slant to the balance of the book's contents, a whole chapter, for example, being devoted to an unexpected but not unwelcome account of experimental methods and their statistical control, and two most valuable chapters to genetical methods of crop improvement, including the use of natural and induced mutations.

The first part of the book covers economic generalities, and the botany, biochemistry and physiology of the plant. Part 2 deals with the culture of the crop, its varieties, propagation, establishment and management. Part 3 gives a thorough account of curing and fermentation, and here, in particular, the wide knowledge and catholic approach of the authors is apparent. Pests and diseases and their control are then described, with a most useful section on the virus diseases and their characteristics set out in tabular form. The last section is on selection and breeding. Each chapter is provided with a full bibliography, and these reveal a wide coverage of world literature, including a fair sprinkling of papers published in 1960.

Printing and pictures are adequate, and the book, as is common in France, is produced as a paper-backed edition. A major and most regrettable omission, however, is that neither subject nor author indexes are provided. A full contents table helps the reader to find his way around, but this is hardly adequate for a work of such a size and importance. With only this one complaint in mind, the book can be confidently recommended as an excellent general account of the tobacco plant and its production and an authoritative picture of the present position of the crop in France.

G.E.T.

7246. González-Sicilia de Juan, E.
El cultivo de los agrios. **(Citrus growing.)**
Instituto Nacional de Investigaciones Agronómicas, Madrid, 1960, 9½ × 7 in., pp. 806, bibls, illus., ptas 325.

The author of this comprehensive work is the Director of the Station for Orange Growing at Burjasot in the Spanish Levant. The book is well illustrated in colour and half-tone, and each major section has its own bibliography. These sections deal with: the origin of citrus types and the spread of their cultivation in Spain; production in individual citrus-growing countries; distribution and production in Spain; climate; soil; classification and varietal descriptions; morphology and anatomy; physiology; genetics; manuring; irrigation; pruning and grafting; cultural practices; propagation, rootstocks and nurseries; orchard establishment; fruit harvesting and conditioning; damage from weather conditions; virus diseases; fungus diseases; and pests. The subject matter is presented with great clarity and is conveniently divided under headings and sub-headings in each section.

Among the individual citrus-growing countries even the smallest producers are covered in considerable detail, but it is unfortunate that the figures for production and trade do not extend beyond 1953 for any country except Spain, for which 1955 is the limit. The section on morphology and anatomy includes data on the chemical composition of leaves, shoots, flowers and fruits, and in the physiology section (with 111 references) the main emphasis is on nutritional deficiences and excesses. The matter on breeding and selection has been collected from many sources, but few of the references are later than 1950. Manuring is covered in detail, except in the case of iron, where a cross reference to the physiology section would have been useful. Other topics omitted or covered inadequately include bulk harvesting, modern synthetic fungicides and sprinkler irrigation for frost protection. The section on pests is particularly well illustrated, and methods for controlling scales are described in detail, but the combination of mineral oils with phosphoric esters is not mentioned, neither is the use of hydrolyzed protein in fruit-fly baits, and the only acaricides mentioned are sulphur, lime-sulphur and oil emulsions. Some of these omissions may not, however, be as momentous as they seem, for in recent years certain plant-protection products have introduced more problems than they have solved, and may soon be regarded as "old fashioned".

In all other respects the book has been prepared with great care and accuracy, and should prove a most valuable contribution to the fundamentals of citrus growing.

K.C.

7247. IKIN, R.
Gladioli.
UNWIN, C. W. J.
Sweet peas.
Amateur Gardening Handbooks, issued by Collingridge, London, 1961, 7 × 4½ in., both pp. 92, illus., 4s.

Both these small books are intended for amateur growers, and there is therefore considerable emphasis on the production of exhibition blooms. The selection of varieties also receives much attention in the gladiolus book, in which almost 30 pages consist of an annotated list of various types.

7248. INTERNATIONAL POTASH INSTITUTE.
Japanese potassium symposium.
International Potash Institute, Berne, [1960], 8½ × 6 in., pp. 110, bibls, illus., 7.50 Swiss fr.

Seven papers on K nutrition were read at the second symposium held at Tokyo in 1958, and of these 2 papers on the nutrition of apple trees and of vegetables are abstracted separately.

7249. KRÜSSMANN, G.
Die Nadelgehölze. **(The conifers.)**
Paul Parey, Berlin, 2nd edition, 1960, 10 × 7½ in., pp. 343, bibl. 3½ pp., illus., DM. 46.

This well-illustrated book contains a complete and authoritative guide both to indigenous forms, and to those found in the botanical collections of Europe. After a section on the names and naming of plants, and a short systematic account of the orders, families and genera of conifers there follow descriptions, in alphabetical order of genera, of 1,483 forms native or hardy in central Europe. It is arranged on similar lines to the author's *Handbook of broadleaved trees and shrubs* [*H.A.*, 29: 3075], and is lavishly provided with clear photographs and line drawings, illustrating tree form and details of morphology. Distribution maps and keys to species within the larger genera are given. Some of the generic names may be unfamiliar; an index of superseded names allows *Wellingtonia*, for example, to be located under *Sequoiadendron*. This is, in short, an indispensible reference work for both the landscape gardener and the botanist interested in conifers.

J.M.

7250. NÉMETH, M.
A gyümölcsfák vírusbetegségei. **(Virus diseases of fruit trees.)**
Mezögazdasági Kiadó, Budapest, 1961, 8 × 5½ in., pp. 296, bibl. 322, illus., 33 Ft.

This well produced little book is a mine of useful information, not only for those able to read Hungarian, but for all who encounter literature on deciduous fruit tree diseases in foreign languages. Following a short general chapter on plant viruses in general and another on fruit tree viruses the virus diseases of 9 fruit species are described in detail. The accepted English names of the individual viruses are given as sub-titles to the Hungarian names, and synonyms in up to 18 European languages, together with Latin names, are included. This is a valuable contribution to horticultural literature, because literal translations of names of diseases are often inaccurate and can be confusing and sometimes misleading. Each disease is then described in the accepted manner, giving the originator(s) of the name, the date of first description, economic importance, geographical distribution, host range, symptoms (with illustrations), spread of infection, duration of latency, indicator plants and control. Some virus-like diseases and other maladies with symptoms resembling those of virus infections, which are caused by mites, herbicides and mineral deficiencies, are also mentioned. The index is multilingual and this enhances the international character and general usefulness of the book.

E.U.

7251. NIJDAM, J. (EDITOR).
Tuinbouwkundig woordenboek in acht talen.
(A horticultural dictionary in eight languages.)
Minist. Landbouw, Dir. Tuinbouw, The Hague, 1961, 7 × 5 in., pp. 504, obtainable outside the Netherlands from Interscience Publishers Inc., New York and London, 55s.

The additional language in this revised edition is Latin, which is confined to plant names. Apart from this the lay-out is the same as for the previous edition [see *H.A.*, 29: 3005], although many more words have been added. Its value to horticulturists trying to understand technical terms is much enhanced by its wider scope. In addition to Latin the languages included are Dutch, English, French, German, Danish, Swedish and Spanish.

7252. PANSIOT, F. P., AND REBOUR, H.
Improvement in olive cultivation.
F.A.O., Rome, 1961, 9 × 6 in., pp. 249, bibl. 110, illus., $2.50 or 12s. 6d. Separate editions in English, French and Spanish.

"It's difficult to determine the best formula for the application of manures or fertilizers for olive trees; moreover, even when manuring or fertilizing is practised, it is seldom done efficiently." Thus the authors on p. 104, and after reading through this catholic-minded, fascinating manual the would-be olive grower may well shrink from the innumerable decisions necessary before he and his family derive any benefit from planting Minerva's sacred tree. Yet the tough Aussie—and he seems the most likely adventurer of those who read these abstracts—will not be deterred by mere difficulty of decision, and he will find this book the most useful comprehensive work in English on olive growing which has yet appeared. Hartmann has issued many useful bulletins on the subject, but they have concerned particular problems in California. The present authors, with the help of other experts in the Mediterranean basin, have spread their net much wider and displayed on their library slab a most diverse collection of interesting and informative fish. One can think of no problem they have neglected. The net result in terms of advice is precisely what might be expected, namely that everything in olive growing depends on an incredible number of factors, inextricably related to the purpose of planting, climate, soil, water, hazards by pest and disease, etc., etc. The very usefulness of the book lies in the fact that no hard and fast rules are laid down, thus instructions on irrigation, for instance, are given subject to certain conditions of environment being fulfilled, and the necessity for modification under different conditions is stressed. Whoever looks for clear-cut advice will have to pause awhile and perpend. If he does, he will be amply repaid.

The authors deal first with the importance of the olive tree and its products, its general botanical characteristics and varieties in 15 countries. They then consider cultural requirements under the headings of climate, soil and water and the general lines on which improvement is possible. Next, well-illustrated chapters concern the various techniques involved in propagation, grove establishment, manuring, pruning, irrigation, control of pests, diseases and other troubles, special cultivation practices such as sub-soiling, fruit thinning, etc. Finally come details of harvesting and crop. All the above are based on the research findings and practical experience of modern olive experts.

A useful list is given of 25 centres in 12 countries where special attention is paid either to research or to the issue of advice on the practical cultivation of olives. Further appendices provide a copy of a modern Tunisian contract as between land owner and olive grower, statistics of olive plantations throughout the world in 1957, and, most interestingly, ecological data on altitude, soil and rainfall—with comments—in different olive growing countries. The final Americanization of the adequate, even now and then sprightly, translation from the original French is noticeable but usually not "overly" painful. D.A.

7253. SHEWELL-COOPER, W. E. (EDITOR), AND OTHERS.
Alpine and rock gardening.
Seeley Service, London, 1961, 8½ × 6 in., pp. 296, illus., 30s.

There is no reason to think that the writer in Ecclesiastes, who already, a few thousand years ago, was complaining that "of making many books there is no end" was being prophetic about the advent of the tireless and prolific Editor of this work, or he would not have added "and much study is weariness of the flesh". Weariness is the last thing to be produced by a study of Dr. Shewell-Cooper's writings and editings. On the contrary they engender in the reader a powerful urge to get out into the garden and do something about it at once.

In this book, the second volume of the Ullswater Library of Gardening, the Editor has gathered a strong team of well-known specialists who happily can add the gift of words to their particular know-how. There are, besides the Editor, eleven contributors, an indication of the extent of the field to be covered. Once a rock gardener gets going on his subject it is very difficult to stop him, and it is possible the Editor had to use the curb rather than the spur. However that may be, the result is a well-balanced book with Will Ingwersen leading off on construction, followed by H. S. Wacher on planting and care, G. H. Preston on propagation and Fred Stoker on shrubs. Other stars twinkle in between and the book concludes, as such books do, with sombre chapters on diseases and pests, conveying, if not a definite whiff of the graveyard, at least a reminder that at any moment it may be a case of "change and decay in all around I see". However, the writer, S. Challenger, is not really alarmed. There are very few disasters, actual or impending, with which it is not possible to cope. Though many plants are discussed in the text, the customary long lists of recommended plants are not conspicuous, it being rightly considered that the reader will get more fun in trying for himself to separate truth from imagination in nursery catalogues. The 51 plates are all excellent. Those illustrating Ingwersen's article, showing methods of placing and treating various (geological) types of stone will be particularly valuable to the do-it-yourselfers, since they deal with the smaller stones rather than with the manhandling of unmanageable boulders, though readers with a taste for cranes and tractors are not forgotten. This is a book which anyone starting a rock garden with serious intent will do well to study. It contains all he will want for a very long time. It is by no means a case of beginners only. The cognoscenti already on the heights may with advantage step down and refresh themselves by a dip into its pages. It is a book to be recommended.

G. St. C.F.

Annuals and reports.

(*See also* 7214, 7215.)

7254. ALKMAAR.
6e Jaarverslag 1960, Proefstation voor de Groenteteelt in de Volle Grond in Nederland. (**Sixth Annual Report of the Experiment Station for Vegetable Growing in the Open in the Netherlands**), 1961, pp. 139, illus., fl. 2.

Progress is reported of work on the following subjects: *Soils and manures:* The use of farmyard manure, town waste, peat products, cacao waste and other organic manures; foliar sprays of Mg for witloof chicory. *Breeding:* Asparagus, beans, peas and chicory. *Variety trials:* With strawberries, gherkins, cauliflowers, beans, celeriac, beetroot, lettuces, leeks (summer, autumn and winter crops) and carrots. *Cultural trials:* Costs of growing gherkins; asparagus harvesting; raising cauliflower and beetroot seedlings; sowing density for leek seeds; transplanting treatments for leeks; shallot storage; spacing and harvesting different spinach varieties; time of sowing spinach; rotations; and, for forced chicory, physiological studies, sowing and lifting times, sowing depths, vernalization and Vapam treatment. *Pests and diseases:* Tipburn and *Phoma lingam* in cabbages; lettuce mosaic; "spring" disease of carrots; leaf miner (*Napomyza lateralis*) in chicory; soil disinfection for vegetable crops. *Weed control:* In endive, celeriac, beetroot, parsley, leeks, rhubarb, scorzonera, lettuces, beans, spinach, chicory and carrots.

7255. ALM. DANSK GARTNERFORENING (SENNELS, N. J., AND PEDERSEN, K.).
Årbog for Gartneri, toogfyrretyvende årgang 1960. (**42nd Danish Horticultural Yearbook 1960.**) S. L. Møllers Bogtrykkeri, Copenhagen, 1961, pp. 216.

In the first part of the yearbook there is a useful directory of official bodies concerned with horticulture in Denmark, and production figures are also given. There are reports of trials on some ornamentals, and the 41st annual report on varieties of brussels sprouts, kale and summer cabbage. Another report gives results of trials on the manuring of cabbages, celeriac and tulips, the width of carnation beds, hot-water treatment against nematodes in shallots and cultural methods for freesias.

7256. CANADA.
Research Report of the Entomology Research Institute for Biological Control, Belleville, Ontario, for 1956-1959, 1959, pp. 45.

In addition to predaceous and parasitic arthropods, parasitic nematodes, fungal, bacterial and virus diseases were studied. An important feature was the importation of useful insects, parasites and disease organisms. Limited local success was attained in the control of noxious weeds by imported insect pests.

7257. CANADA.
Review of the National Research Council 1960, being **NRC 5788**, 1961, pp. 354, 75 cents.

The biological work reported here is mostly of a fundamental nature, not directly concerned with horticultural problems.

7258. CENTRAL EXPERIMENTAL FARM, OTTAWA.
Progress Report of the Horticulture Division, Central Experimental Farm, Ottawa, for 1954-58, 1960, pp. 178, bibls, illus.

Owing to reorganization this is to be the final report in this form from the Horticulture Division, Central Experimental Farm. Work which has already been published is summarized briefly, together with some later results. Some of these reports have been abstracted separately. Among the rest are included the following: Breeding of apples (progeny analyses, scab resistance and irradiation of seeds), strawberries and raspberries. Winter hardiness studies on apple rootstocks and varieties. Studies on highbush and lowbush blueberries, cranberries, elderberries and bake-apples. Genetics of snapdragons and kalanchoë. Zinc as a micronutrient for beans, peas, apples and tomatoes. Apple nutrition and storage quality as affected by fungicides and soil mulching. Gibberellic acid applied before and after transplanting tomatoes. Propagation of deciduous and evergreen trees and shrubs under mist and with rooting hormones, and the transplanting of rooted softwood cuttings from mist beds. Breeding of chrysanthemums, lilies, *Syringa* and *Malus.* Controlled atmosphere storage, and apple behaviour within the stores. Breeding and variety trials of beans, cabbages, cucumbers, eggplants, peas, radishes and tomatoes. Seed rates for beans grown for mechanical picking. Gamma irradiation of onions before storage. The effects of spotted cotyledons on seed germination and plant growth in lettuce. Chemical weed control in beans, beets, spinach and tomatoes. Mechanical sorting of horticultural data. *Horticultural Sub-station, Smithfield:* Trials on apple pruning, rootstocks and control of fruit drop with chemical sprays. Variety trials with apples, strawberries, raspberries, peas and tomatoes. Tomato nutrition, spacing, and soil calibration with tomatoes. Pea rotations and weed control. Irrigation of peas and tomatoes. *Horticultural Organic Soil Sub-station:* Chemical weed control in vegetable crops. Effects of pesticides on celery yields. Seed rates for bunching onions.

7259. Colonial Pesticides Research Unit, Porton.
Annual Report, 31st March, 1961, being *CPRU/Porton/Rep.* **185**, 1961, pp. 19.

Of indirect horticultural interest are reports of work on pesticide applications from aircraft, assessment techniques, and retention and run-off from angled surfaces.

7260. Colorado.
Agricultural research serves Colorado, being ***72nd Annual Report of the Colorado Agricultural Experiment Station, 1958-59,*** 1959, pp. 17, illus.

Including trials of new varieties of onion, tomato and carnation.

7261. Committee for Colonial, Agricultural, Animal Health and Forestry Research.
Fifteenth Annual Report (1959-60), 1960, pp. 23-160.

Research findings noted in this report include: *Citrus:* Parathion sprays gave good control of the citrus midge (*Contarinia citri*) on lemons in Cyprus. In Zanzibar wither tip (*Gloeosporium limetticola*) of limes was economically controlled by spraying with 3 lb. Kramsol (phenyl mercury nitrate) per 100 gal. *Coffee:* In Kenya very encouraging results in vegetative propagation were obtained with a N.I.A.E. Burgess-type intermittent mist propagator. Also in Kenya, captan gave good control of coffee rust (*Hemileia vastatrix*) during February to April, but copper sprays were more effective from October to November. *Oil palms:* Irrigation water applied at 2 in. per week maintained the soil at near field capacity in West Africa. *Sugar cane:* In British Honduras a N top-dressing in August followed by a NP dressing in May resulted in a 7-ton increase in yield per acre. *Loquat:* Spraying with 3% lime-sulphur or 0·625% Cupravit gave good control of scab in Cyprus.

7262. Committee of the Privy Council for Agricultural Research.
Report of the Agricultural Research Council for the year 1959-60, H.M.S.O., London, 1961, pp. 209, 9s.

After early sections on administration and finance there is a series of short reviews, which include one on taste and flavour and another on the irrigation of vegetables in the United Kingdom. The latter part of the report comprises brief reports from research stations and similar institutions, partly or wholly financed by the A.R.C., including John Innes, Glasshouse Crops, East Malling, Long Ashton, Mylnefield, Wye, Wellesbourne, Ditton Laboratory and others less directly concerned with horticultural studies.

7263. Gembloux.
Rapport général, Station de Recherches de l'État pour l'Amélioration des Plantes fruitières et maraîchères, 1959. **(General Report of the State Research Station for the Improvement of Fruit and Market Garden Crops, Gembloux, 1959)**, [1960], pp. 98.

Progress is reported of investigations on the following projects: *Training:* Formation pruning of apple varieties on M.IX and semi-dwarfing stocks; renewal pruning of Cox; formation pruning of pear on quince. *Other apple and pear trials:* Apple and pear hedges; double-working pears; improving the fertility of Doyenné du Comice; plum variety trials; weed control in apples including trials with 5 herbicides on 3 varieties; cultural techniques for apples on semi-dwarfing stocks, including the effect of planting out at different dates after grafting; fungal effects on apples, including investigations of 2 fungicides on Reinette de France. *Strawberries*: Breeding and testing new varieties; anti-virus thermotherapy; data on flowering and fruit ripening for many varieties; glass vs. plastic for early ripening (6 varieties); greatly increased yields of 3 varieties with black plastic mulching. *Vegetables*: Pea and bean variety collections, breeding and selection; tomato variety collection and trials, tomato breeding; chicory types, clones, fertilization and forcing; onion, asparagus, spinach, lettuce, carrot, celery and cauliflower varieties, breeding and selection; pure seed production of vegetables. *Deep freezing:* Pea and strawberry varieties; cold storage of grapes.

7264. Georgia.
A decade of progress in serving Georgia through research, including ***Annual Report of the University of Georgia College of Agriculture Experiment Stations for 1960,*** Athens, Georgia, [1960], pp. 158, illus.

The Annual Report, which comprises a list of staff, projects and publications, is combined with a review of accomplishments and progress over the past ten years. *Field crops:* Combined weed, disease and nematode control in tobacco was obtained with methyl bromide at 9–15 lb./100 sq. yd. Using methyl bromide in alternate years with Cyanamid soil fumigant gave more consistent weed control. Mechanical shattering of the subsoil to a depth of 17 or 18 in. directly under the tobacco row, 3–4 weeks before transplanting, increased yield and value per acre of cured leaf. Nitrate N was superior for tobacco leaf production to ammonia, urea and organic forms of N on fumigated soils. Blue mould control was obtained with 70% maneb at ½ lb./100 gal. and with 4 oz. 70% maneb plus 4 oz. powdered salicyllic acid plus 1 oz. Dreft/100 gal. Both sprays may be combined with parathion and TDE. A 3-year rotation with resistant crops controlled root-knot nematodes. DD mixture, EDB-40, Telone and Dorlone also successfully controlled root-knot nematodes in tobacco. Bulk curing of tobacco, which obviates stringing and subsequent handling operations, reduced labour needed by 85%. *Flowers and shrubs:* Potted azalea plants which were shaded during the summer proved more winter-hardy during the following winter and produced larger forced blooms. Variety trials of camellias are reported. Die-back in camellias increased with the addition of N or a mixed fertilizer; captan sprays reduced die-back in some instances. Root rot was reduced by fumigation with Dowfume MC 2 at 1 lb./50 sq. ft. High quality snapdragons were produced at 4 × 4 in. spacing and by fertilization with 50 p.p.m. N, 75 p.p.m. P and 40 p.p.m. K. The survival of mist-rooted cuttings in general was found to depend on aeration and moisture content rather than type of medium; those rooted under mist and partial shade survived better than those rooted under mist and full sun. Variety trials of roses are reported. Pre-cooled tulip bulbs flowered earlier and produced longer stems in warm winters. *Fruits and vegetables:* Captan applied weekly from the pre-pink stage until after petal-fall and then at 2-week intervals until 30 days before harvest controlled apple black rot. Gamma irradiation of muscadine grapes resulted in fruits of twice the normal size. Spacing of 12 × 20 ft. was the most practical for muscadine grapes. Control of Bermuda grass was obtained using dalapon 85% w.p., 10 lb. being applied in 2 applications 17 days apart. Black rot and insect control on grapes was obtained with ferbam and DDT (2 lb. of each/100 gal.). Variety trials on peaches are reported; good peach tree growth was obtained with 0·48 lb. N per bearing tree. Plum curculio in peach orchards was controlled with parathion-sulphur sprays. Parathion also controlled scale insects, oriental fruit moth and peach tree borers. Peach scab was controlled with sulphur (6 lb./100 gal.) or captan (2 lb./100 gal.). A cooling unit able to reduce the interior temperature of peaches from 95° to 36° F. in 30 min. is mentioned. New Flint blackberry, a disease resistant variety with a long fruiting period and which does not develop mould as quickly as other varieties, is described. New techniques, using softwood cuttings in cold frames, resulted in 90% of rabbiteye blueberry cuttings taking root. Strawberry plants set on 15 September fruited better than those set on 15 November; methyl bromide soil fumigation combined with 2,000 lb. fertilizer and irrigation resulted in the highest production by strawberries. The highest yields of cabbages were obtained with an 8–8–8 fertilizer with at least ¼ of the N in an organic form. The Georgia 47 cantaloupe is resistant to downy mildew, powdery mildew and aphis. Bacterial spot and ripe rot of capsicums were controlled with a copper fungicide and with mixtures of copper and streptomycin; PNCB is recommended for the control of southern stem rot of capsicums. The increase in tomato yields due to increased amounts of fertilizer was further augmented by irrigation. The Spalding watermelon is described as a small, high quality, disease-resistant melon with a tough rind.

7265. HONG KONG.
Annual Departmental Report by the Director of Agriculture, Fisheries and Forestry for the financial year 1959-60, 1960, pp. 95, illus., HK $4.00.

Much of the work of the *Market garden* section of the Research Service was devoted to the selection and bulking of improved strains of vegetables, particularly of spinach, Chinese flowering cabbage, Chinese white cabbage, Chinese kale, garland chrysanthemum, water spinach, Chinese spinach, Chinese lettuce and Chinese radish. A number of U.K., U.S. and Hawaiian varieties of tomato were tested, among which the wilt-resistant Manalucie and Indian River attracted attention. The early pea varieties Progress No. 9, Laxton Progress and Thomas Laxton proved more suitable than maincrop varieties; and the Tender Best French bean gave the highest yield. Temperate varieties of cauliflower, cabbage and lettuce found suitable are mentioned. *Plant pest and disease*: Economic control of the stink bug (*Tessaratoma papillosa*) on litchis was obtained with an [unspecified] insecticidal spray.

7266. JAMAICA.
Investigations 1956-1957.
Bull. Minist. Agric. Lands Jamaica **57**, 1960, pp. 137, 3s. 6d.

The work summarized in this bulletin is in 2 sections, the first of which deals with the main field and tree crops. *Economic entomology:* Trithion, Chlorocide and Akar 338 proved superior to lime-sulphur for the control of *Eriophyes oleivorus* on citrus. Dieldrex 15 and dieldrin 50% w.p. were effective as soil insecticides against citrus fiddler beetle grubs for up to 3 years after application. Biological control of various pests with insect, fungal and bacterial parasites was continued. *Plant pathology*: Dressings of gypsum significantly increased the total number of tomatoes produced and also the number affected with blossom-end rot. *Cultivated trees, shrubs and vines:* Establishment studies were made on the newly introduced black pepper and West Indian cherry. With Lacatan bananas 16 cwt. K_2O per acre per annum increased the number of hands in the 3rd crop by 9%, and 50 lb. F.Y.M. per stool per year appreciably increased the quality of the 2nd crop. In a frequency of fertilizer application trial on Lacatan bananas the best results were obtained from 3 dressings of N per annum; KCl improved quality and yield and its absence in the presence of N caused premature yellowing; P gave no response. The cacao variety I.C.S.60 was significantly better than all others. Work on breadfruit storage, cashew selection, coffee and coconuts is also reported.

7267. JAMALAINEN, E. A.

Maatalouden Tutkimuskeskuksen Kasvitautien Tutkimuslaitoksen Toiminta VV. 1911-1960 ja sen nykyiset tehtävät. **(Activities of the Department of Plant Pathology of the Agricultural Research Centre during the period 1911-1960 and its present activity.)** [English summary pp. 20.]

Valt. Maatalousk. Julk. **188**, 1961, pp. 60, bibl. 8 pp., illus.

This comparatively short but comprehensive account of research work in Finland includes details of: Vernalization of onions; club root of crucifers; control of grey mould and *Sclerotinia* on beans, cucumbers, lettuces and some ornamentals; bean resistance to anthracnose and viruses; soil disinfectants for controlling damping-off; control of apple scab and gloeosporium; studies on raspberry viruses; and control of leaf spot and root-rooting fungi on strawberries.

7268. JORDAN.

Eighth Annual Report of the Deir Alla Research Station for 1959, 1960, in 2 vols, pp. 89, illus., and pp. 83.

Oil seeds: The castor bean variety Cimarron Hybrid gave the highest yield at Deir Alla, and variety 145–4 × 415 at Wadi Yabis. The earliest sowing date, 1 November, was the best of 5. With safflower, however, 1 December proved to be the best sowing date, and the local variety gave the heaviest crop. *Other crops:* In a variety and planting-date trial with sugar cane there was little difference between the 3 Barbados varieties used, and the best planting time was early October. The second volume, which is an appendix to the Report, is concerned wholly with field crops and fodder trials.

7269. KENTUCKY.

Results of research in 1957 and 1958, being *70th* and *71st Annual Reports of the Director, Kentucky Agricultural Experiment Station*, 1958 and 1959, both pp. 90.

Agricultural engineering: The use of a priming machine for harvesting burley tobacco gave significantly higher net yields, and the use of both priming and stalk-cutting machines gave higher gross returns per 100 lb. cured leaf, than were obtained with hand cutting; a 2-in. spacing of coated tobacco seeds produced the best plants for transplanting. *Agronomy:* Tobacco quality was not affected by the source of potash; yields of tobacco in a glasshouse study increased with increasing applications of P up to the 4-ton level, after which they decreased; studies of the N constituents of the leaf and the N status of the soil are reported. Delayed topping after spraying burley tobacco with maleic hydrazide controlled suckers as effectively as topping just prior to spraying. Methyl bromide at 3–4 lb. 100 sq. ft. destroyed all tobacco mosaic virus in live tomato roots. *Entomology and botany:* Removing the cap from strawberry fruits decreased the residue of chemical sprays by 50%; flavour evaluation trials on sprayed strawberries are reported. Chemicals which controlled the green peach aphid and the flea beetle in tobacco are listed, and variety trials for resistance to green peach aphid in tobacco are reported; the incidence of tobacco streak was reduced by high dosages of insecticides; chemicals giving 90% control of wireworm in burley tobacco are listed; *Bacillus thuringiensis* gave 83–95% control of hornworms in tobacco 6–8 days after spraying. Complete control of melon aphid on cucumbers was obtained with Phosdrin at 0·1 lb. acre; endrin plus Phosdrin controlled cabbage worm in broccoli. *Horticulture:* Blueberry plants died in areas where the sawdust mulch had been removed. Breeding and variety trials of tomatoes, snap beans, blueberries and strawberries are reported. Increases in yields of cabbages, lima beans, squash and tomatoes were obtained using black plastic mulch, and further increases occurred when thin clear plastic was placed over the black plastic with a little soil between. Fertilizer plus hormone-boron-sugar solutions applied to leaves and blooms increased tomato yields. Trials with 48 herbicides on 7 vegetable crops are reported. Results of investigations at the Robinson and Western Kentucky Substations are also reported. [These Reports were received after the 1959 Report, which was abstracted in *H.A.*, 31: 5578.]

7270. KENYA.
Annual Report of the Department of Agriculture for 1959. Vols. I and II, 1960 and 1961, pp. 63 and 174, Sh. 4 and Sh. 7/50.

Vol. I is an administrative report, Vol. II a record of investigations. Amongst details of numerous investigations the following results are of major interest: *Entomology:* Good control of both thrips and mites on pyrethrum was obtained with a Metasystox spray at 5 fl. oz. per acre. Complete destruction of the scale *Saissetia coffeae* on coffee roots was obtained when they were dipped in 0·1% Rogor in 2½% white oil or in 5% white oil for 5 minutes. *Eretmocerus serius,* a parasite of citrus black fly has been firmly established. *Plant pathology:* A marked reduction in damping-off in pyrethrum seedlings was obtained with seed dressings of captan, Spergon and thiram. *Coffee research*: Mulching before the long rains increased clean coffee yields by as much as 4 cwt./acre and post-rains mulching by 2½ cwt./acre. *Horticulture:* In a manurial trial with strawberries highly significant yield increases were obtained with a dressing of 40 tons/acre of F.Y.M. Airblast application of cuprous oxide or zineb reduced blight defoliation in tomatoes from 80% to 7·75–9·0% with a very considerable increase in crop. A series of trials with asparagus showed that irrigation increased both yield and grade and that F.Y.M. was 50% more effective as a fertilizer than NPK. *Pyrethrum:* Phosphate caused the greatest response of various treatments, including P, K, Ca and combinations between them. *Sisal:* Plant management, fertilizer, variety and herbicide trials are reported.

7271. LOW TEMPERATURE RESEARCH STATION, CAMBRIDGE.
Annual Report, 1959, [1960], pp. 39, 2s. 6d.

Imported fruits: Persistence of astringency in bananas which otherwise appear ripe is probably due to chilling below 53° F. either on the plantation or during distribution. Bananas should be picked when the ratio of pulp to peel is between 1·3 and 1·4 to 1·0. No significant differences were found in the heat production by different banana varieties at temperatures used in transport and ripening rooms. Differences in the production of CO_2 in the range 32° F. to 50° F. were found among different varieties of South African plums.

7272. MACAULAY INSTITUTE FOR SOIL RESEARCH.
Annual Report 1959-1960, pp. 52.

In the *Plant physiology* section work is in progress on nutrient interactions in mustard plants. With broad beans an increased Fe concentration in the nutrient medium was followed by an accumulation of malic acid in the leaves. The relationship between cation exchange capacity and pectin content of leek roots was investigated. In other studies no conclusive relationship between cation exchange capacity and the mineral composition of the plant was established.

7273. MACHLIS, L., AND BRIGGS, W. R. (EDITORS).
Annual review of plant physiology, Vol. 12. Annual Reviews, Inc., Palo Alto, Calif., 1961, 9 × 6 in., pp. 502, bibls, $7.00 U.S.A., $7.50 elsewhere.

Review articles of horticultural interest include: Some aspects of amino acid synthesis in plants and related subjects, by A. I. Virtanen; Structure and function of mitochondria, by F. L. Crane; Structure and physiology of cell walls, by G. Setterfield and S. T. Bayley; Minor mineral nutrients, by D. J. D. Nicholas; Soil-plant relationships in ion uptake, by M. Fried and R. E. Shapiro; Protein synthesis, by G. Webster; Photosynthesis under natural conditions, by J. F. Talling; Photosynthesis, by G. Hoch and B. Kok; Phosphorylation in higher plants, by E. Marré; Biosynthesis and function of carotenoids, by T. W. Goodwin, Biochemistry of senescence, by J. E. Varner; Plant water deficits and physiological processes, by Y. Vaadia, F. C. Raney and R. M. Hagan; Photoperiodism and the flowering process, by F. B. Salisbury; Indole auxins, by C. H. Fawcett; Applied aspects of the gibberellins, by N. W. Stuart and H. M. Cathey; Kinetin and related compounds in plant growth, by C. O. Miller; Geotropism in roots and shoots, by H. Rufelt; Photochemical air pollution damage to plants, by J. T. Middleton; Physiology of wilt disease, by T. S. Sadasivan.

7274. MAURITIUS.
Annual Report of the Department of Agriculture for the year 1959, 1961, pp. 79, R.1.25.

Experimental work was continued on the breeding and selection, pests and diseases of tea, fibre crops, tobacco and a number of vegetable crops. The Sugar Industry Research Institute Report is issued separately.

7275. METCALF, R. L. (EDITOR).
Advances in pest control research, Vol. IV. Interscience Publishers, New York and London, 1961, 9 × 6 in., pp. 347, bibls, illus., 94s.

As well as a number of papers on the chemical aspects of pest control this volume contains the following reviews: Some fundamental aspects of applied insect pathology, by I. M. Hall; Principles of aquatic plant control, by T. F. Hall; and A digest of available information on the insecticide malathion, by D. Spiller.

7276. MINNESOTA.
Sixty-sixth Annual Report of the Minnesota Agricultural Experiment Station, 1958-1959, pp. 52.

Staff and publications listed.

7277. Naaldwijk. (van Soest, W., and others.) *Jaarverslag 1960, Proefstation voor de Groenten- en Fruitteelt onder Glas te Naaldwijk.* **(Annual Report of the Research Station for Vegetable and Fruit Growing under Glass, Naaldwijk, for 1960),** pp. 162, illus. [English summaries 9½ pp.]

Short English summaries together with translations of the tables and diagrams are given for the following general articles: The lay-out of new nurseries; The development of chrysanthemum growing in 1950–1960; Drainage of soils under glass; Potassium fertilization of tomatoes; Nitrogen fertilizing of autumn and winter lettuce; Growing tomatoes with more than one stem; Cucumber growing in the autumn; Growing hot-bed lettuce in relation to a maincrop; Spring culture of snapdragons; The germination of tomato pollen on the stigma; Quality and yields of tomatoes after hormone sprays; Damage to horticultural crops by factory fumes [see *H.A.*, 31: 3625]; Root rot of tomatoes; A new predator of the red spider, *Tetranychus urticae;* Some new soil disinfectants (N-methyldithiocarbamate and Nemagon); and Temperature control in glasshouses. The research sections include work on the following subjects: *Soil, water and manuring:* Irrigation of frame cucumbers; manuring of lettuces and cauliflowers; differences in earliness of lettuces attributable to soil differences; minor elements for tomatoes and cauliflowers; liquid fertilizers and trickle irrigation for tomatoes; tomato manuring in relation to flower abnormalities; trickle irrigation of cauliflowers; manuring of cauliflowers. *Soilless culture:* Glasshouse tomatoes, cucumbers and lettuces. *Cultural trials:* Tomatoes (grafting and rootstocks, growing with more than 1 stem, raising seedlings, temperature control after planting out); cucumbers (grafting, covering with plastic frames, growing in winter); melons (ventilation and manuring in frames, grafting); capsicums (grafting); lettuces (forcing temperatures, mulching, plastic greenhouses); chicory (pre-forcing treatment of roots); fruits (rootstocks for Black Alicante grapes, peach tree forms, rootstocks for plums); flowers (storage temperatures for freesia corms and for *Nerine undulata*, growing winter snapdragons, forcing irises). *Physiological studies:* Root development of lettuces; rooting of grape cuttings; uptake of foliar-applied P by tomato plants; the phytotoxic effects of glycerine on tomato plants; foliar sprays of sugar, manganese or urea for tomatoes; artificial illumination for tomatoes, melons, capsicums and chrysanthemums; tomato pollination; the effect of day length and temperature and of pruning on cucumber yields and flower formation; pollination of egg-plants; growth substance effects on truss size and fruit set of tomatoes, and on fruit set of melons; gibberellic acid sprays applied to autumn cucumbers and stocks. *Breeding and variety trials:* Tomatoes, cucumbers, melons, capsicums, lettuces, spinach, cauliflower, kohlrabi, grapes and freesias. *Storage and packing:* Tomatoes and grapes. *Pests and diseases:* Studies on physiological, virus, bacterial and fungal diseases, and on pests of glasshouse crops and their control. *Technical studies:* Automatic irrigation and an automatic water pump.

7278. National Institute of Agricultural Engineering. (The British Society for Research in Agricultural Engineering.) ***Annual Report of the National Institute of Agricultural Engineering 1959-60,*** [1961], pp. 97 + Suppl. pp. 302, bibls, illus.

The departmental reports cover the following investigations: *Glasshouse research:* The measurement and control of air temperature in glasshouses; heat loss from glasshouses; temperature requirements of glasshouses; water requirements of plants under glass; the use of transparent films compared with glass; the control of plant environment in growth cabinets and glasshouses for crop experimentation; the measurement of natural light and radiation. *Horticultural engineering:* Irrigation (including mist propagation and automatic watering of glasshouse crops); mechanization of bulb lifting and planting; a two-way tractor; comparison between methods of basic tillage for outdoor vegetable crops; spraying machinery and spray distribution; work studies on harvesting bulbs and apples; hot-water treatment of bulbs. *Instrumentation:* Control equipment for mist propagation; analysis of tomato plant and fruit material for nutritional and quality differences. *Mechanical engineering:* Hop harvesting and drying; a pea viner for experimental plots. *Soil:* Vegetable and root harvesters. *Scottish station:* Harvesting of canning carrots. In a supplement to the Annual Report the test reports (Nos. 235–265) are collected.

7279. Nederlands Nieuw Guinea. *Verslag van de Stichting voor Agrarisch Onderzoek ten behoeve van Nederlands-Nieuw-Guinea over het jaar 1959.* **(Report of the Foundation for Agricultural Research for Dutch New Guinea, 1959),** 1960, pp. 72 + appendices, illus.

In the *Crop research section* work on the breeding and selection of cacao, and on clonal studies of rubber are summarized.

7280. Nigeria, Eastern Region. ***Annual Report of the Agriculture Division for 1959-60,*** 1961, pp. 52, illus., 2s.

Annual crops: Army worms on vegetables were controlled with Agrocide 3 and DDT. Albolineum was effective against mealybugs and Agrocide 26 controlled *Zonocerus variegatus*, both on cucurbits. Mildew on cucumbers, pumpkins and marrows was controlled by a suspension of Perenox in Alboneum. The tomato variety Zuarungu was resisant to *Septoria lycopersici*. *Permanent crops:* Regular spraying of cacao to control black pod and capsids was continued. Applications of ldrin to coconut seedlings reduced termite attack, and trees also responded well to the application of lb. mixed fertilizer and 3 lb. magnesium sulphate. Sprays of Gammalin 20 were recommended for the control of capsids and aphids on cashews. *Botany:* Emulsions of 5% 2,4-D or 2,4,5-T, applied as foliar sprays at the rate of 1 gal./tree, killed oil palms, the latter being the more effective. Citrus rootstock/scion trials are reported, and also variety trials and selection work with tomatoes, onions, peppers, chillies and beans.

7281. NORTHERN NUT GROWERS' ASSOCIATION.
50th and ***51st Annual Reports of the Northern Nut Growers' Association, 1959,*** Jacksonville, Ill., pp. 148, and ***1960,*** Knoxville, Tenn., pp. 112.

Several of the papers read at these annual meetings have been abstracted separately.

7282. OKLAHOMA.
Report of the Oklahoma Agricultural Experiment Station for the biennium July 1, 1958 to June 30, 1960, 1960, pp. 23.

Staff and publications listed.

7283. PENNSYLVANIA.
Seventy-third Annual Report of the Pennsylvania Agricultural Experiment Station for the fiscal year ended June 30, 1960, being *Bull.* **671**, 1960, pp. 32.

Staff, projects and publications listed.

7284. REPUBLIC OF IRELAND.
29th Annual Report of the Minister for Agriculture 1959-60, Dublin, Govt Publs Sale Office, 1961, pp. 138 + 123, 8s. 6d.

An administrative report containing little of direct horticultural interest.

7285. SMITH, K. M., AND LAUFFER, M. A. (EDITORS).
Advances in virus research, Vol. VII.
Academic Press Inc., New York and London, 1960, 9 × 6 in., pp. 397, bibls., illus., £4 or $10.00.

Among the review articles included in this volume are: The biology of soil-borne plant viruses, by B. D. Harrison; Variation in plant viruses, by J. H. Hitchborn and A. D. Thomson; and Density gradient centrifugation and its application to plant viruses, by M. K. Brakke.

7286. STEINHAUS, E. A., AND SMITH, R. F. (EDITORS).
Annual review of entomology, Vol. 6.
Annual Reviews Inc., Palo Alto, Calif., 1961, pp. 470, bibls, $7.00 (U.S.A.) or $7.50 (elsewhere).

Of indirect horticultural interest among the 22 reviews are: Biological control of pest insects in Europe, by J. M. Franz; Sampling crop pests and their hosts, by A. H. Strickland ; and Ecological aspects of plant virus transmissions, by W. Carter.

7287. STOCKBRIDGE HOUSE (N.A.A.S.).
Report of the Stockbridge House Experimental Horticulture Station, 1949 to 1959, 1960, pp. 91.

Variety trials are reported of brussels sprouts, cauliflowers, red beet, leeks, onions, lettuces, peas, carrots, rhubarb, strawberries, self-blanching celery, climbing French beans, apples, plums, damsons, black currants, gooseberries, red currants and raspberries. Trials on 2-year-old rhubarb roots of the variety Victoria, which had known weights of fang root removed before bedding down in their forcing positions, showed that the loss of forced crop was proportional to the weight of root removed. Effective weed control in onion sets was obtained with fenuron plus CIPC; hot-water treatment of onion sets resulted in a slight reduction in yield. Nabam and zinc sulphate controlled tomato leaf mould in either heated or unheated structures. Chrysanthemum cuttings in JIP2 compost showed improved bloom quality compared with those in JIP1; plants bedded out in frames gave consistently better results than those in pots, soil blocks or in the original cutting boxes. The highest yields of early flowering chrysanthemums were obtained from cuttings struck in February and planted out in late April. Lateness in striking late-flowering chrysanthemums resulted in a decrease in stem length and delay in date of maturity. Sodium chloride and ammonium sulphate in the casing layer reduced total mushroom crop weight and the number of mushrooms, but increased the weight of individual mushrooms; total mushroom yield declined with increasing additions of dry shredded compost or chopped wet compost. Wheat straws composted for 4 weeks gave higher yields than those composted for 3 weeks. Bradley's King and Frogmore were the most vigorous of 5 damson varieties tested for their suitability as a windbreak.

7288. SUMMERLAND.
Summary Report of Research, Summerland, B.C., for 1959, 1960, pp. 35.

Pomology (tree fruits): The second generation of vegetatively propagated plants from previously irradiated material displayed changes, especially in leaf characteristics, and certain dwarf types of sweet cherry may prove valuable. Artificial freezing of shoots accelerated selection of apples for hardiness. DPA controlled storage scald in immature Delicious and Stayman apples. Successful thinning of Winesap apples is reported using napthalene acetamide (Amid Thin) at 17 p.p.m. plus Tween 20. Slow cooling reduced storage life and quality of pears. *Vegetables and ornamentals:* Direct seeding increased early yields in tomatoes. Vegadex (6 qt./acre) controlled weeds in bush beans, and Kuron (2½ pt./acre) controlled weeds in lawns. *Soils and irrigation:* Sprinkler irrigation used 30–35% less water than furrow irrigation; more water was used on sandy soils than on silt and clay soils. *Plant pathology:* A crude ferric ammonium lignin sulphonate "Greenz 26" at the rate of 10 lb./100 gal. or 10 lb./acre was non-phytotoxic, and as effective as FeDTPA, in correcting Fe deficiency; ZnEDTA and ZnDTPA at 2 lb./acre or 2 lb./100 gal., and zinc sulphate (6 lb.) with hydrated lime (8 lb.) are recommended to correct Zn deficiency. *Phytophthora cactorum* and *Pythium* sp. occurred with more than twice the frequency in the soil around pear trees with severe symptoms of decline than around healthy or moderately affected trees in the same orchard; Vapam (1 qt./100 sq. ft.) controlled *Pythium* sp. The resistance of apple and pear varieties to collar rot is reported. Apple scab was controlled with Cyprex (3 lb./acre) or dichlone (2 lb./acre) applied only after infection. A close relationship was shown between twisted leaf of sweet cherry and ring pox of apricot; both viruses are found in choke cherries, which should be removed from the vicinity of stone-fruits. There is evidence that brown rot of stone fruit is caused by *Sclerotinia fructicola* only; pre-harvest sprays of ferbam with S.E.C. oil protected ripe fruits during harvest, shipment and storage. Vascular browning from *Verticillium* infection was found in a greater number of apricot and peach trees which had received applications of ammonium nitrate than in unfertilized trees; *Verticillium* wilt in strawberries was prevented by methyl bromide soil fumigation. Control of halo blight in bush beans was obtained with 3 weekly sprays of Agrimycin to young plants. Seradix B1 gave the best control of basal stem rot in geranium stem cuttings. *Entomology:* Complete sterility was obtained in codling moth males with a gamma radiation dosage of 65,000 rad. Sevin controlled DDT-resistant codling moth and green aphid, but encouraged the development of the McDaniel mite. Some control of the peach twig borer, codling moth and the fruit tree leaf roller was obtained using *Bacillus thuringiensis*. Hoe 2784, a new nitro derivative from Germany, controlled the European red mite and the McDaniel mite and caused less fruit and foliage injury than DN Dry Mix No. 1. Guthion and dimethoate w.p. controlled pear psylla. Petal-fall sprays of Sevin controlled *Lecanium coryli* on apricots. A single spray of Systox (1 pt./100 gal.) in mid-July eliminated black cherry aphids on non-bearing 3-year-old sweet cherry trees. *Agricultural engineering:* Spray developments and assessments are reported. *Fruit and vegetable processing:* The best ciders were made from freshly picked fruit or from fruit ripened at 70° F. for a minimum length of time.

7289. TANGANYIKA.

Annual Report of the Department of Agriculture for 1959, Parts I and II. Dar es Salaam, 1960, pp. 39 and 25, Part I, illus., 5s., Part II, 3s. ***Record of research work carried out in 1959,*** [1960], pp. 96 [cyclostyled].

Part I is an administrative report; Part II contains a shorter version of the reports of research work more fully described in the cyclostyled Record. Results reported include the following: Trials of 7 onion varieties. In bean variety trials local beans greatly outyielded haricot and Black Prince. Aldrin powder slurried with water protected seed beans against bean fly. Thinning Zanzibar and Portuguese East African varieties of cashew increased yields per tree; sprays of dieldrin (4 oz./4 gal./acre) controlled *Helopeltis* spp. on this crop. Dutch mixture (30% P_2O_5, 6% N) applied at 200 lb./acre increased the yields of pyrethrum flowers more than superphosphate and basic slag; cutting back in March, April and May as well as December reduced yields; 15 sprays of dieldrin and DDT to control thrips did not affect the dried flower yield. The application of 0·3 cwt. N and 0·75 cwt. K_2O per acre increased tobacco yields; plantings in December had the highest yields on both red and grey soils. F.Y.M. in the planting hole improved the growth rate of both arabica and robusta coffee seedlings. Bananas reduced the growth of both robusta and arabica coffee in proportion to the density of the bananas in an interplanting experiment. Irrigating coffee increased yields and prevented die-back. Copper fungicide sprays on coffee had a marked effect on leaf retention and improved the general appearance of the foliage. In a coffee root study made 3 years after planting roots were discovered 8 ft. from the tree; they were well distributed throughout the planting hole, but outside the planting hole they were confined to the top 12 in. of soil. The application of 15 lb. F.Y.M. per planting hole increased the growth of tea bushes; urea had an adverse effect but sulphate of ammonia improved growth and leaf colour. The fertilization of coconut palms did not increase yields. Castor bean yields were much reduced by inter-cropping. Castor, grown in a field surrounded by a *Panicum maximum* fallow, cropped twice as heavily as castor surrounded by cereal crops; variety, spacing and time of sowing trials are also reported for this crop. Cashew seed nuts of high density germinated better and produced larger seedlings than those of low density.

290. WESTERN CANADIAN SOCIETY FOR HORTICULTURE.
Report of Proceedings of the Fifteenth Annual Meeting of the Western Canadian Society for Horticulture, 1959, Winnipeg, Man., cyclostyled pp. 67.

At the Annual Meeting reports were given from several committees covering vegetables, fruits, ornamentals and extension activities. Subjects considered included the following: breeding top fruits for winter hardiness; lime-induced chlorosis in apple stocks and strawberries; breeding ornamentals; seedling blight of peas; resistance of rhubarb to red leaf disease; selecting tomatoes by back-crossing; and trials with a selective gametocide on tomatoes and cucumbers.

7291. WESTERN CANADIAN SOCIETY FOR HORTICULTURE.
Report of Proceedings of the Sixteenth Annual Meeting of the Western Canadian Society for Horticulture, 1960, Saskatoon, Sask., cyclostyled pp. 87.

The Vegetable Committee reports on: progress in the co-operative tomato breeding programme; the application of gibberellin to radishes, peas, spinach, carrots, tomatoes and celery; browning effects in carrots; vegetable variety trials; the use of polythene as a mulch; and leaf analysis as a means of tackling nutritional problems of vegetables. In the report of the Ornamentals Committee subjects included are; the effect of seed maturity on viability; after-ripening techniques; propagation studies (covering softwood cuttings, germination techniques, alternating temperatures to promote rose seed germination, enforced dormancy of some woody perennials, rose rootstocks, seasonal rooting of *Thuja pyramidalis* from cuttings); after-ripening of Swiss stone pine as affected by temperature and gibberellic acid; alternating temperatures and their effect on the germination of *Shepherdia argentea*; germination of *Cotoneaster lucida*; and plastic greenhouses and their adaptability to prairie conditions. Subjects included in the Fruit Committee report are: raspberry breeding methods and problems; yields from virus-free strawberries compared with those from commercially-available stocks; control of lime-induced chlorosis in strawberries; the effect of mulching and propagation techniques on the regeneration of blueberries and cranberries; the effect of pruning on natural stands of native blueberry; breeding hardy strawberries; and fruit introductions.

7292. ZANZIBAR.
Annual Report of the Department of Agriculture for the year 1959, 1960, pp. 44, illus., 2s. ***Results of Field Experiments, Crop and Stock Records and other Statistics,*** 1960, pp. 24, 2s.

The Annual Report contains brief notes on current work with bananas, cacao, cardamoms, chillies, citrus, cloves, coconuts, coffee, derris, kapok, nutmegs, patchouli, pineapples and tobacco. The following results are reported in the Supplement: *Ground crops:* Pineapples responded markedly to coir dust mulch, and chillies to F.Y.M. A spacing experiment with derris indicated 6 in. apart in 5-ft. rows to be the most productive spacing, although 1-ft. spacing in the rows gave the highest cash return. *Tree crops:* Deep mulching with banana trash gave significant yield increases in coffee for the 5th year in succession. In bananas the greatest yield increases were obtained from F.Y.M., although the responses to sulphate of ammonia and coir dust mulch were also significant.

New periodicals.

7293. CROP SCIENCE SOCIETY OF AMERICA.
Crop Science. [*Crop Sci.*], 1961, Vol. 1, No. 1, 11 × 8½ in., pp. 83, bibls, illus., Crop Science Society of America, 2702 Monroe St., Madison 5, Wis., $12 p.a. in the U.S.A. and Canada, $13 elsewhere.

This new companion publication to the *Agronomy Journal* has been created to relieve that journal of specialized articles on field crops, pastures and ranges, seed technology and turf grasses, and will appear 6 times a year. One article of general interest for horticulture is noted in this number of *H.A.*

7294. EUROPEAN WEED RESEARCH COUNCIL. (FRYER, J. D., EDITOR.)
Weed Research. [*Weed Res.*], 1961, Vol. 1, No. 1, 10 × 7 in., pp. 90, illus., Blackwell Scientific Publications, Oxford, quarterly at 25s., annually 80s. or $14.

This new publication is the official journal of the European Weed Research Council. Papers are written in English, French and German, with summaries in all 3 languages. Its aim is not to attract all relevant work, but rather to become a gathering point for reporting research of international importance. Considering the vast amount of material published on weeds and their control, much of which is only of ephemeral or local value, the appearance in Europe of a single authoritative organ will be welcomed by everyone interested in this subject. The list of contents in No. 1, and the advanced list published for No. 2, show that, although papers on fundamental aspects will occupy a major part of the journal, there will also be a fair number describing weed control investigations in agricultural and horticultural crops.

7295. INTERNATIONAL SOCIETY FOR HORTICULTURAL SCIENCE. (WATERSCHOOT, H. F., EDITOR.)
Chronica Horticulturae. [*Chron. Hort.*], 1961, Vol. 1, No. 1, 11 × 8 in., pp. 19, P.O. Box 30, Wageningen, The Netherlands, issued 3 times a year to members.

The appearance of *Chronica Horticulturae* is a clear sign that the ISHS is now firmly established. Its aim is "to bring together such scientific, professional and personal news as may serve to promote international relations and co-operation in horticulture". It can be taken as a foregone conclusion that international relations will be better served by this modest publication than by the host of so-called statesmen now prancing on the Worlds' creaky stage. This first number is largely concerned with the organization of the ISHS and wit earlier attempts to promote international co-operation in the field of horticultural science. A feature of particular interest is the first of a serie of articles on horticultural research throughou the world, in which concise details are given o research now in progress at individual centres i Finland, Norway and Sweden.